KAHIKINUI DRIVEWAY REPAIRS PHASE 1

JOB NO. M-18-515

KAHIKINUI, HANA, MAUI, HAWAII

TMK: (2) 1-9-001:003 POR

PREPARED FOR THE:

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
KAHIKINUI, HANA, MAUI, HAWAII

PREPARED BY:

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS • HONOLULU • WAILUKU • HILO

CONSULTANTS

CIVIL ENGINEER:

AUSTIN, TSUTSUMI & ASSOCIATES, INC.

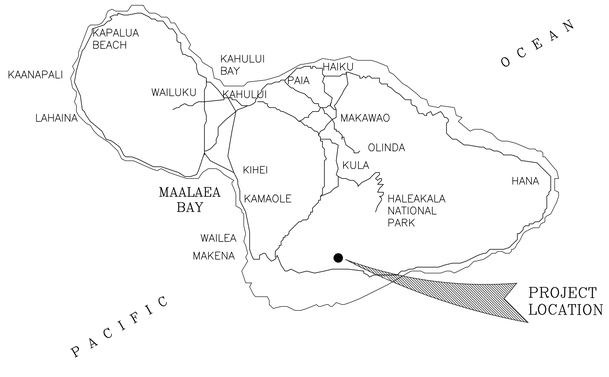
GEOTECHNICAL ENGINEER:

PSC CONSULTANTS, LLC

ARCHAEOLOGIST:

CULTURAL SURVEYS HAWAII, INC

PROJECT LOCATION



ISLAND OF MAUI

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APPROVALS

AustinTsutsumi & ASSOCIATES, INC.
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1871 WILI PA LOOP, SUITE A
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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

ADRIENNE W.L.H. WONG
LICENSED PROFESSIONAL ENGINEER
No. 6378
HAWAII, U.S.A.

This work was prepared by me or under my supervision and construction of this project will be under my observation. (Observation of construction as defined in Chapter 16-115 Subchapter 1 Definitions of the Hawaii Administrative Rules "Professional Engineers, Architects, Surveyors, and Landscape Architects.")

SIGNATURE — APRIL 30, 2020 EXP. DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY

Project No:	18-515
Scale:	AS NOTED
Date:	11/22/2019
Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

TITLE SHEET

DWG. NO.

T-1

SHEET 1 OF 13

Z:\2018\18-515\ENGINEERING\DWG\T-1 TITLE SHEET.dwg, November 25, 2019

GENERAL CONSTRUCTION NOTES

1. ALL CONSTRUCTION WORK SHALL BE DONE IN ACCORDANCE WITH THE "HAWAII STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2005" AS AMENDED, AND THE "STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION", DATED SEPTEMBER 1984, AS AMENDED, OF THE DEPARTMENT OF PUBLIC WORKS, CITY AND COUNTIES OF THE STATE OF HAWAII, THE "STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION STANDARD PLANS" 2008, THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICE FOR STREETS AND HIGHWAYS", 2009, AND THE CONSTRUCTION DRAWINGS, DETAILS, AND SPECIFICATIONS PREPARED FOR THIS PROJECT.

2. WHEREVER CROSSINGS OR CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGES TO THE FACILITIES WHETHER SHOWN OR NOT ON THE PLANS.

3. NO CONSTRUCTION EQUIPMENT SHALL BE PARKED WITHIN THE ROAD RIGHT-OF-WAY IN SUCH A MANNER THAT THE EQUIPMENT WILL OBSTRUCT THE NORMAL MOVEMENT AND SIGHT DISTANCE OF THE DRIVING MOTORIST, EXCEPT DURING ACTUAL WORKING HOURS.

4. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES AS SHOWN ON THE PLANS ARE FROM THE LATEST AVAILABLE DATA, BUT ARE NOT GUARANTEED AS TO THE ACCURACY OF THE ENCOUNTERING OF OTHER OBSTACLES DURING THE COURSE OF LOCATION OF UNCHARTED UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE, AND SHALL PAY FOR ALL DAMAGES TO EXISTING UTILITIES.

5. EXCEPT DURING ACTUAL WORKING HOURS, ALL SIGNS WHICH DO NOT PERTAIN TO THE CONSTRUCTION ACTIVITY, SUCH AS "MEN WORKING" AND "FLAGMEN AHEAD" SHALL BE COVERED OR LAID DOWN. HOWEVER, ALL SIGNS NECESSARY FOR THE SAFETY OF THE PUBLIC SHALL BE MAINTAINED.

6. THE CONTRACTOR SHALL EMPLOY A HAWAII REGISTERED PROFESSIONAL LAND SURVEYOR TO PERFORM ALL CONSTRUCTION STAKEOUTS, THE COST OF WHICH SHALL BE BORNE BY THE CONTRACTOR.

7. THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR, AND PAY FOR ALL TEMPORARY UTILITIES REQUIRED FOR HIS WORK.

8. SHOULD HISTORIC SITES SUCH AS WALLS, PLATFORMS, PAVEMENTS AND MOUNDS, OR REMAINS SUCH AS ARTIFACTS, BURIALS, CONCENTRATION OF CHARCOAL OR SHELLS BE ENCOUNTERED DURING CONSTRUCTION WORK, WORK SHALL CEASE IN THE IMMEDIATE VICINITY OF THE FIND AND THE FIND SHALL BE PROTECTED FROM FURTHER DAMAGE. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE STATE HISTORIC PRESERVATION DIVISION ((808) 243-5169), WHICH WILL ASSESS THE SIGNIFICANCE OF THE FIND AND RECOMMEND AN APPROPRIATE MITIGATION MEASURE, IF NECESSARY. A MINIMUM 3-METER / 10-FOOT WIDE BUFFER ZONE EXISTS AROUND ALL SITES IN PRESERVATION DURING CONSTRUCTION. IT IS HIGHLY IMPORTANT THAT THE PRESERVED SITES REMAIN UNDISTURBED.

9. THE CONTRACTOR SHALL PROCURE AND PAY FOR ALL LICENSES AND PERMITS AND SHALL GIVE ALL NOTICES NECESSARY AND INCIDENTAL TO THE DUE AND LAWFUL PROSECUTION OF THE WORK.

10. THE CONTRACTOR SHALL RESTORE ALL EXISTING FACILITIES INCLUDING BUT NOT LIMITED TO PAVEMENT, DRAINAGE FACILITIES, CURBS, GUTTERS, SIGNS, LANDSCAPING, IRRIGATION SYSTEMS, ETC., REMOVED OR DAMAGED AS A RESULT OF HIS OPERATION USING MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH "HAWAII STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION", 2005 AS AMENDED, "STANDARD DETAILS", SEPTEMBER 1984 FOR PUBLIC WORKS CONSTRUCTION OF THE DEPARTMENT OF PUBLIC WORKS, COUNTY OF MAUI, AS AMENDED.

11. CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES AND OTHER PROTECTIVE DEVICES FOR THE PROTECTION, SAFETY AND CONVENIENCE OF THE PUBLIC ACCORDING TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", 2009 AND THE "RULES AND REGULATIONS GOVERNING THE USE OF TRAFFIC CONTROL DEVICES AT WORK SITES ON/OR ADJACENT TO PUBLIC STREETS AND HIGHWAYS", ADOPTED BY THE HIGHWAY SAFETY COORDINATOR AND THE U.S. FEDERAL HIGHWAY ADMINISTRATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS", DATED 2009.

12. THE DIRECTOR OF PUBLIC WORKS HAS THE RIGHT TO STOP CONSTRUCTION SHOULD ANY WORK BE FOUND CONTRARY TO THE APPROVED CONSTRUCTION PLAN OR DETRIMENTAL TO THE PUBLIC'S INTEREST.

13. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH, AND COUNTY GRADING ORDINANCE.

14. THE CONTRACTOR SHALL REMOVE AND DISPOSE ALL SILT AND DEBRIS DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS RESULTING FROM HIS WORK. THE COST INCURRED FOR ANY NECESSARY REMEDIAL ACTION ORDERED BY THE DIRECTOR OF PUBLIC WORKS SHALL BE PAID BY THE CONTRACTOR.

15. CONSTRUCTION DEBRIS AND WASTES SHALL BE DEPOSITED AT AN APPROPRIATE SITE. THE CONTRACTOR SHALL INFORM THE DIRECTOR OF PUBLIC WORKS OF THE LOCATION OF THE DISPOSAL SITES. THE DISPOSAL SITE MUST FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE. THE CONTRACTOR SHALL MINIMIZE ITS CONSTRUCTION DEBRIS AND SOLID WASTES.

16. CONTRACTOR SHALL PROVIDE VEHICULAR AND PEDESTRIAN ACCESS ROUTES AT ALL TIMES TO ALL EXISTING FACILITIES.

17. ALL DIMENSIONS AND DETAILS SHOWN ON THE DRAWINGS SHALL BE CHECKED AND VERIFIED PRIOR TO THE START OF CONSTRUCTION, AND ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.

GENERAL CONSTRUCTION NOTES (CONT.)

18. PURSUANT OF MAUI COUNTY CODE SECTION 3.44.015(C), THE COUNTY OF MAUI IS NOT RESPONSIBLE FOR ANY PARK, ROADWAY, EASEMENT (INCLUDING BUT NOT LIMITED TO DRAINAGE, SEWER, ACCESS, RECLAIMED WATER OR AVIGATION EASEMENT), OR ANY OTHER INTEREST IN REAL PROPERTY SHOWN ON THIS MAP OR SHOWN ON THESE PLANS, UNLESS THE MAUI COUNTY COUNCIL HAS ACCEPTED ITS DEDICATION BY A RESOLUTION APPROVED BY A MAJORITY OF COUNCIL'S MEMBERS AT A REGULAR OR SPECIAL MEETING OF THE MAUI COUNTY COUNCIL.

19. THE CONTRACTOR SHALL SUBMIT ONE HARDCOPY AND ONE COMPLETE ELECTRONIC SET (TIF OR PDF) OF THE FINAL FIELD POSTED AS-BUILT DRAWINGS PRIOR TO THE FINAL APPROVAL AND ACCEPTANCE OF THE IMPROVEMENTS.

20. COMPACTION REQUIREMENTS:

    A. TESTING OF MATERIALS SHALL BE CONDUCTED BY AN APPROVED INDEPENDENT TESTING AGENCY IN ACCORDANCE WITH ASTM STANDARD METHODS OR AS SPECIFIED BY THE DEPARTMENT OF PUBLIC WORKS, ENGINEERING DIVISION, AS FOLLOWS:

        1. EMBANKMENT/SELECT BORROW AND SUBGRADE MATERIALS: ONE (1) COMPACTION TEST PER 600 SQUARE YARDS PER LIFT;
        2. AGGREGATE SUBBASE COURSE: ONE (1) COMPACTION TEST PER 400 SQUARE YARDS; ONE (1) GRADATION AND SAND EQUIVALENT TEST PER LIFT PER PROJECT;
        3. AGGREGATE BASE COURSE: ONE (1) COMPACTION TEST PER 300 SQUARE YARDS; ONE (1) GRADATION AND SAND EQUIVALENT TEST PER LIFT PER PROJECT;
        4. ASPHALT CONCRETE PAVEMENT OR ASPHALT TREATED BASE COURSE: THREE (3) A.C. CORES FOR THICKNESS AND DENSITY TESTS PER PROJECT;
        5. TRENCH BACKFILL MATERIAL: ONE (1) TEST FOR EACH 300 LINEAL FEET OF TRENCH PER LIFT OF MATERIAL.
        6. ADDITIONAL TESTING MAY BE REQUIRED FOR ANY REASON INCLUDING RESULTS TO THE COUNTY'S INSPECTION AGENCY FOR REVIEW AND APPROVAL PRIOR TO THE COUNTY'S ACCEPTANCE OF WORK.

    B. CONTRACTOR SHALL SUBMIT ALL TESTING REPORTS, INCLUDING RESULTS TO THE COUNTY'S INSPECTION AGENCY FOR REVIEW AND APPROVAL PRIOR TO COUNTY'S ACCEPTANCE OF WORK.

    C. THE CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE COUNTY OF ANY TESTING FAILURES AND CORRECT EACH FAILURE PRIOR TO PROCEEDING TO THE NEXT PHASE OF CONSTRUCTION.

PUBLIC HEALTH, SAFETY, AND CONVENIENCE

1. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL QUALITY.

2. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AND SURROUNDING AREAS FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH. THE COUNTY OF MAUI MAY REQUIRE SUPPLEMENTARY MEASURES AS NECESSARY.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEANING AND REMOVAL OF ALL SILT AND DEBRIS DEPOSITED AND ACCUMULATED WITHIN DOWNSTREAM WATERWAYS, DITCHES AND DRAIN PIPES AND ON PUBLIC AND PRIVATE ROADWAYS GENERATED BY HIS WORK. THE CONTRACTOR AGREES TO REIMBURSE THE COUNTY OF MAUI FOR ALL COSTS EXPENDED IN PERFORMANCE OF THE ABOVE WORK IF REQUIRED FOR PUBLIC HEALTH AND SAFETY, OR MADE NECESSARY BY NON-PERFORMANCE BY THE CONTRACTOR.

4. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC.

5. THE CONTRACTOR SHALL PROVIDE A NOISE POLLUTION CONTROL PLAN WHEN APPLYING FOR A CONSTRUCTION PERMIT.

6. TEMPORARY PEDESTRIAN ROUTES SHALL BE MAINTAINED IN SAFE, PASSABLE AND ACCESSIBLE CONDITION COMPLYING WITH ADAAG 402.1.

CONTRACTOR'S RESPONSIBILITY FOR EXISTING LINES, PIPES, SERVICES AND FEATURES

1. INFORMATION REGARDING THE SITE SHOWN ON THE DRAWINGS OR SPECIFICATIONS HAS BEEN OBTAINED BY THE ENGINEER AND IS BELIEVED TO BE REASONABLY CORRECT; HOWEVER, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL SUCH INFORMATION. THE CONTRACTOR SHALL TONE THE AREA TO BE EXCAVATED TO ASCERTAIN THE LOCATION OF UNCHARTED UTILITIES. CONTRACTOR SHALL CONTACT HAWAII ONE CALL CENTER TEN (10) DAYS PRIOR TO ANY EXCAVATION WITHIN STATE OR COUNTY RIGHT-OF-WAY TO ALLOW FOR ADEQUATE RESPONSE TIME IF CONFLICTS ARE FOUND AND NOT CAUSE DELAYS TO THE CONTRACTOR'S WORK.

2. ANY UTILITIES THAT THE CONTRACTOR ENCOUNTERS DURING THE PROGRESS OF THE WORK, SUCH AS BUT NOT LIMITED TO TELEPHONE DUCTS, ELECTRIC DUCTS, WATER LINES, SEWER LINES, ELECTRIC LINES, TRAFFIC SIGNAL DETECTION LOOPS OR DEVICES, AND DRAINAGE PIPES, WHETHER SHOWN OR NOT ON THE CONTRACT PLANS, SHALL NOT BE DISTURBED OR DAMAGED UNLESS OTHERWISE INSTRUCTED IN THE PLANS AND SPECIFICATIONS.

3. IN THE EVENT THE UTILITIES ARE DAMAGED OR DISTURBED BY THE CONTRACTOR, THE CONTRACTOR SHALL BE HELD LIABLE FOR THE DAMAGED OR DISTURBED UTILITIES.

4. THE CONTRACTOR SHALL REPAIR THE DAMAGED OR DISTURBED UTILITIES TO EXISTING OR BETTER CONDITION AT NO COST TO THE OWNER. ANY DAMAGE CLAIMS DUE TO THE DISRUPTION OF SERVICE CAUSED BY THE UTILITIES BEING DAMAGED SHALL BE PAID BY THE CONTRACTOR, WHO SHALL SAVE HARMLESS THE OWNER AND ENGINEER FROM ALL SUITS, ACTIONS OR CLAIMS OF ANY CHARACTER BROUGHT ON ACCOUNT OF SUCH DAMAGES.

5. IN THE EVENT UTILITIES WHICH WERE NOT SHOWN ON THE PLANS AND SPECIFICATIONS ARE DAMAGED OR DISTURBED BY THE CONTRACTOR, THE CONTRACTOR SHALL BE HELD LIABLE. THE CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES AND EXPOSE ALL UTILITY LINES PRIOR TO ANY EXCAVATION AND/OR INSTALLATION OF LINES.

6. ANY EXISTING IRRIGATION LINES, LANDSCAPE AND/OR DECORATIVE FEATURES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING OR BETTER CONDITION AT NO COST TO THE OWNER.

7. ALL EXISTING TRAFFIC SIGNALS, IF APPLICABLE, SHALL BE KEPT OPERATIONAL DURING THE COURSE OF CONSTRUCTION. APPROVED DETECTION DEVICES USED ON A TEMPORARY BASIS DURING CONSTRUCTION SHALL BE INSTALLED THREE (3) WORKING DAYS PRIOR TO ANY SIGNALIZED INTERSECTION WORK WHICH INCLUDES BUT NOT LIMITED TO PAVEMENT RECONSTRUCTION, UTILITY TRENCHING, AND COLD PLANING. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE HAWAII STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2005 AND AT THE CONTRACTOR'S EXPENSE.

8. THE CONTRACTOR SHALL COORDINATE WITH SANDWICH ISLES COMMUNICATIONS (SIC) PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION WORK. ALL COMMUNICATIONS SHOULD BE DIRECTLY BETWEEN SIC AND THE CONTRACTOR

GRADING NOTES

1. ALL GRADING AND STOCKPILING WORK SHALL BE IN ACCORDANCE WITH MAUI COUNTY CODE, TITLE 20, CHAPTER 8.

2. ALL DEBRIS SHALL BE REMOVED FROM THE SITE AND PREMISES LEFT IN A "RAKE CLEAN" CONDITION.

3. THE CONTRACTOR, AT HIS EXPENSE, SHALL KEEP THE PROJECT AND SURROUNDING AREA FREE FROM DUST NUISANCE.

4. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF CHAPTER 54, WATER QUALITY STANDARDS, AND CHAPTER 55, WATER POLLUTION CONTROL, OF TITLE 11, ADMINISTRATIVE RULES OF THE STATE DEPARTMENT OF HEALTH, AND IF APPLICABLE, THE NPDES PERMIT FOR THE PROJECT.

5. ALL EXISTING UTILITIES, WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE PROTECTED AT ALL TIMES, UNLESS NOTED OTHERWISE.

6. ALL PLANTER AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING WORK HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED. PLANTING SHALL BE MAINTAINED TO MINIMIZE EROSION.

7. THE CONTRACTOR SHALL OBTAIN A GRADING PERMIT FROM THE DEVELOPMENT SERVICES ADMINISTRATION TWO WEEKS PRIOR TO COMMENCEMENT OF ANY CLEARING AND GRUBBING WORK. A SITE SPECIFIC EROSION CONTROL PLAN SHOWING STRUCTURAL & NON-STRUCTURAL BEST MANAGEMENT PRACTICES MUST BE SUBMITTED TO AND APPROVED BY THE DEVELOPMENT SERVICES ADMINISTRATION PRIOR TO ISSUANCE OF A GRADING PERMIT AND COMMENCEMENT OF ANY CLEARING AND GRUBBING WORK.

8. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.

9. THE COUNTY SHALL BE INFORMED OF THE LOCATION OF THE BORROW/DISPOSAL SITE FOR THE PROJECT WHEN THE APPLICATION FOR A GRADING PERMIT IS MADE. THE BORROW/DISPOSAL SITE MUST ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.

10. NO GRADING WORK SHALL BE DONE ON SATURDAYS, SUNDAYS AND HOLIDAYS AT ANY TIME WITHOUT PRIOR NOTICE TO THE CHIEF ENGINEER.

11. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.

TEMPORARY EROSION CONTROL MEASURES

1. TEMPORARY GROUND COVER SHALL BE APPLIED WITHIN A PERIOD OF 14 CALENDAR DAYS AFTER THE SITE HAS BEEN GRADED, OR BARED OF VEGETATION, OR IF FINAL GRADING OF THE SITE WILL BE SUSPENDED FOR MORE THAN 21 CALENDAR DAYS. ALL COST FOR MAINTAINING IRRIGATING AND REMOVING TEMPORARY EROSION CONTROL MEASURES WILL BE BORNE BY THE CONTRACTOR.

2. THE CONTRACTOR MAY USE HYDRO-MULCH TO APPLY THE TEMPORARY GROUND COVER.

3. TEMPORARY GROUND COVER SHALL CONSIST OF 2,000 LBS. PER ACRE WOOD CELLULOSE FIBER MULCH AND 65 LBS. PER ACRE TACKIFIER.

PERMANENT EROSION CONTROL MEASURES

1. THE CONTRACTOR SHALL GRASS ALL EXPOSED AREAS THAT HAVE BEEN CONSTRUCTED TO FINAL GRADES. SITES THAT WILL NOT BE DISTURBED FOR A PERIOD OF TWENTY-ONE (21) DAYS OR MORE WILL BE STABILIZED FOURTEEN (14) DAYS AFTER THE LAST DISTURBANCE AS PER SECTION 20.08.035(G) OF THE MAUI COUNTY CODE. ALL COSTS FOR MAINTAINING AND WATERING PERMANENT EROSION CONTROL MEASURES WILL BE BORNE BY THE CONTRACTOR.

2. THE CONTRACTOR MAY USE HYDRO-MULCH TO APPLY THE PERMANENT GROUND COVER.

3. PERMANENT BERMUDA GROUND COVER SHALL CONSIST OF 75 LBS. PER ACRE BERMUDA GRASS, 50 LBS. PER ACRE RYE GRASS, 6,000 LBS. PER ACRE GYPSUM BASED GEOBINDER, 2,000 LBS. PER ACRE WOOD CELLULOSE FIBER MULCH, AND 400 LBS. PER ACRE 10-30-10 FERTILIZER.

4. PERMANENT GROUND COVER ALONG NATURAL DRAINAGEWAYS SHALL CONSIST OF 100 LBS. PER ACRE BERMUDA GRASS, 50 LBS. PER ACRE RYE GRASS, 1,500 LBS. PER ACRE WOOD CELLULOSE FIBER MULCH, 400 LBS. PER ACRE 10-30-10 FERTILIZER, AND PERMANENT EROSION CONTROL/TURF REINFORCEMENT MATTING.

TEMPORARY DUST CONTROL MEASURES

1. EXCAVATION, EMBANKMENT AND IMPORTED MATERIALS SHALL BE KEPT DAMPENED WITH WATER DURING THE GRADING OPERATIONS.

2. THE CONTRACTOR SHALL MAINTAIN A SUITABLE WATER SYSTEM AND DAMPEN THE GRADED OR GRUBBED SITE WITH WATER.

3. AT THE END OF EACH DAY, SEVEN (7) DAYS A WEEK, THE PROJECT SITE SHALL BE KEPT DAMP WITH WATER. THE SITE SHALL BE SUFFICIENTLY DAMPENED SO THAT THE SITE WILL REMAIN MOISTENED DURING THE NIGHT.

RESIDENTIAL TRAFFIC CONTROL

1. CONTRACTOR SHALL PROVIDE AND MAINTAIN A TEMPORARY BYPASS ACCESS ROAD FOR RESIDENTS AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.

Austin Tsutsumi & Associates, Inc.
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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

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LICENSED PROFESSIONAL ENGINEER
No. 6378
HAWAII, U.S.A.

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SIGNATURE — APRIL 30, 2020 EXP. DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY

Project No:	18-515
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Date:	11/22/2019
Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

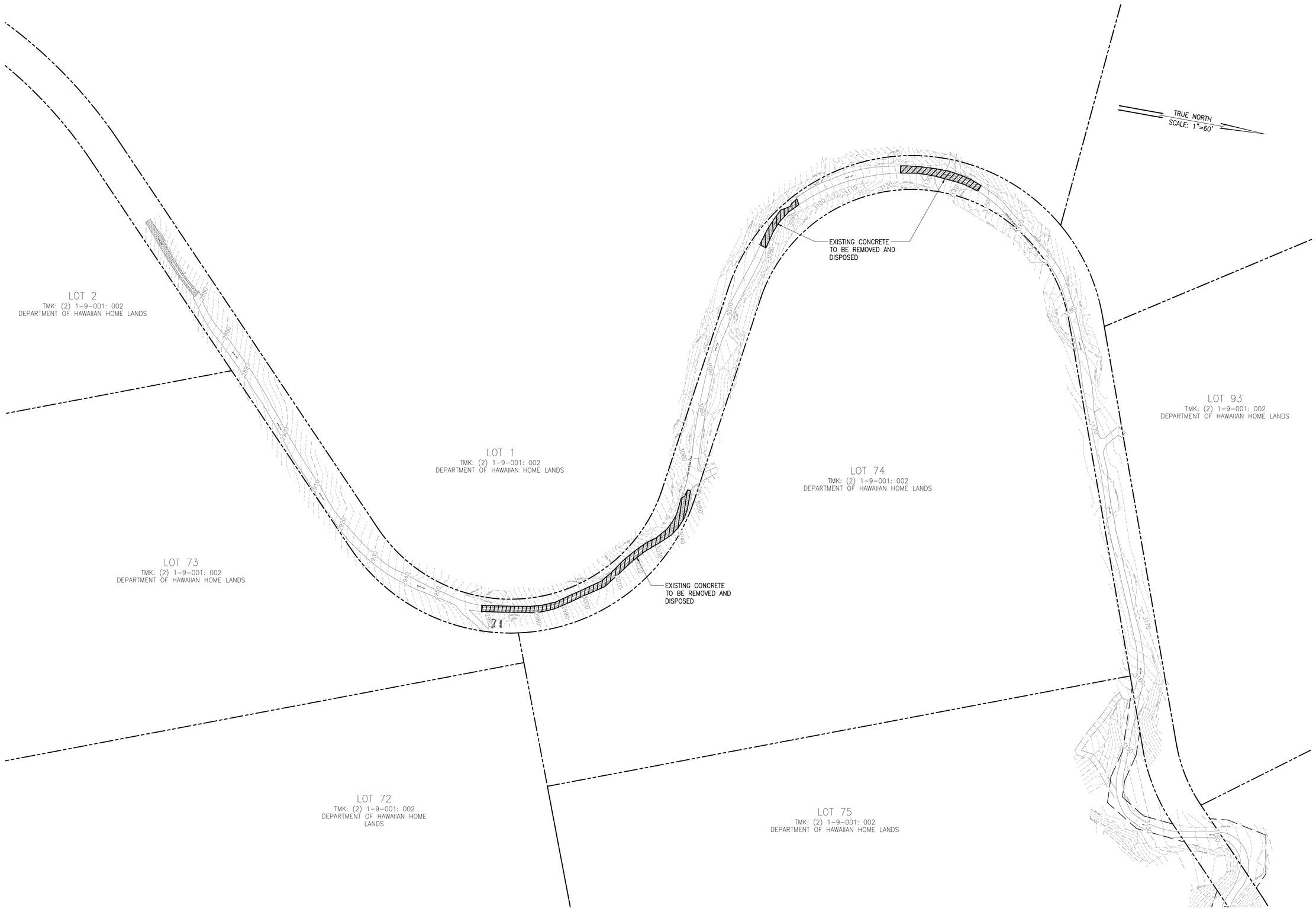
CONSTRUCTION NOTES

DWG. NO.

C-1

SHEET 2 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-1 CONSTRUCTION NOTES.dwg, November 25, 2019



EXISTING TOPO AND DEMO PLAN

SCALE: 1"=60'

AustinTsutsumi & ASSOCIATES, INC.
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EXISTING TOPO AND DEMO PLAN

DWG. NO.

C-2

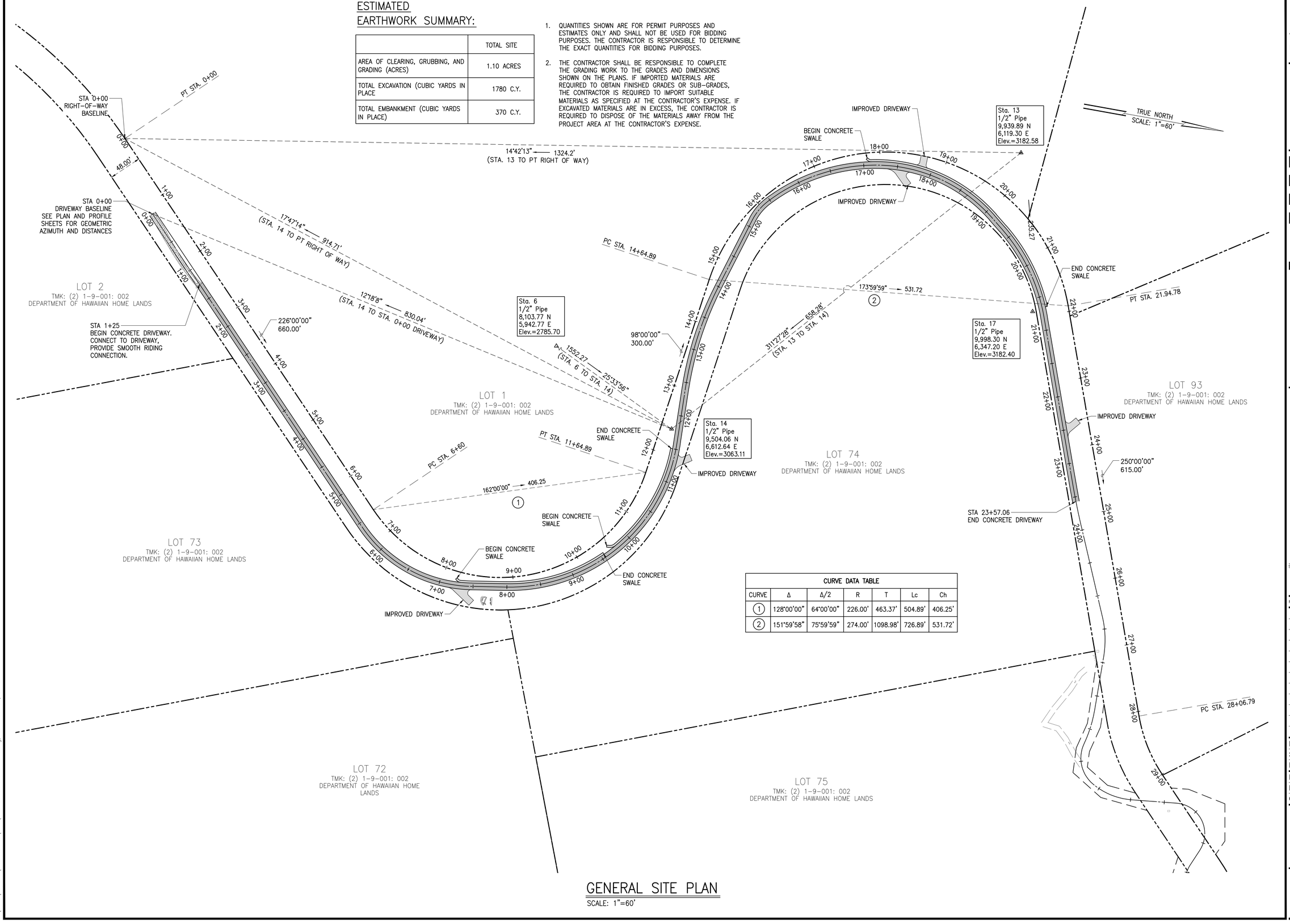
SHEET 3 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-2 EXISTING TOPO AND DEMO PLAN.dwg; November 25, 2019

ESTIMATED EARTHWORK SUMMARY:

	TOTAL SITE
AREA OF CLEARING, GRUBBING, AND GRADING (ACRES)	1.10 ACRES
TOTAL EXCAVATION (CUBIC YARDS IN PLACE	1780 C.Y.
TOTAL EMBANKMENT (CUBIC YARDS IN PLACE)	370 C.Y.

1. QUANTITIES SHOWN ARE FOR PERMIT PURPOSES AND ESTIMATES ONLY AND SHALL NOT BE USED FOR BIDDING PURPOSES. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE EXACT QUANTITIES FOR BIDDING PURPOSES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE TO COMPLETE THE GRADING WORK TO THE GRADES AND DIMENSIONS SHOWN ON THE PLANS. IF IMPORTED MATERIALS ARE REQUIRED TO OBTAIN FINISHED GRADES OR SUB-GRADES, THE CONTRACTOR IS REQUIRED TO IMPORT SUITABLE MATERIALS AS SPECIFIED AT THE CONTRACTOR'S EXPENSE. IF EXCAVATED MATERIALS ARE IN EXCESS, THE CONTRACTOR IS REQUIRED TO DISPOSE OF THE MATERIALS AWAY FROM THE PROJECT AREA AT THE CONTRACTOR'S EXPENSE.



CURVE DATA TABLE						
CURVE	Δ	Δ/2	R	T	Lc	Ch
(1)	128°00'00"	64°00'00"	226.00'	463.37'	504.89'	406.25'
(2)	151°59'58"	75°59'59"	274.00'	1098.98'	726.89'	531.72'

GENERAL SITE PLAN
SCALE: 1"=60'

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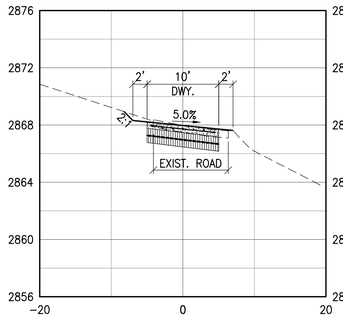
GENERAL SITE PLAN

DWG. NO.
C-3
SHEET 4 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-3 GENERAL SITE PLAN.dwg, November 25, 2019



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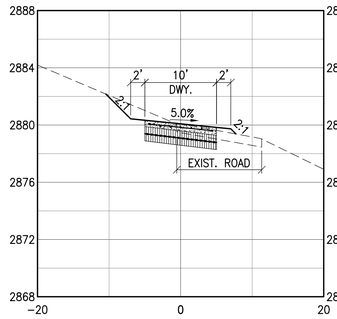

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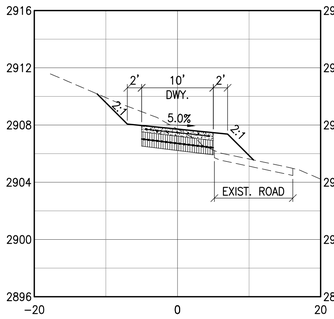

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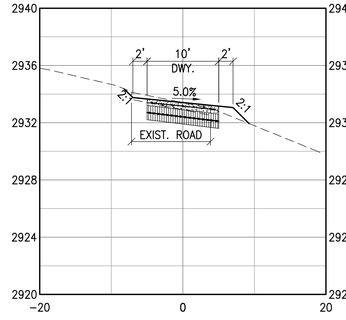

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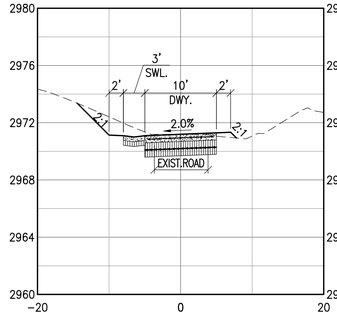

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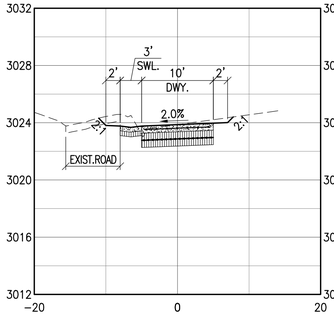

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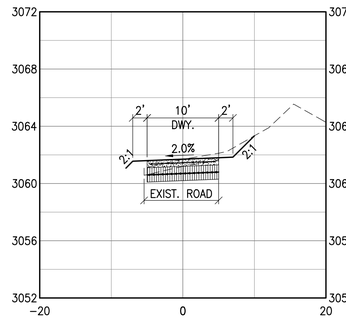

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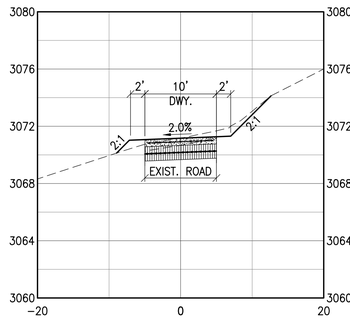

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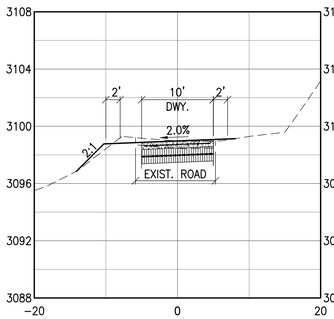

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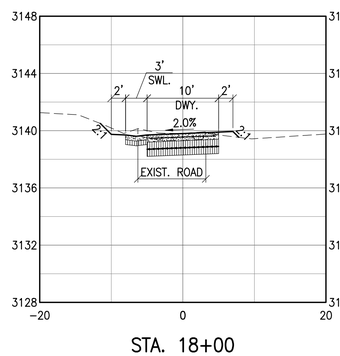

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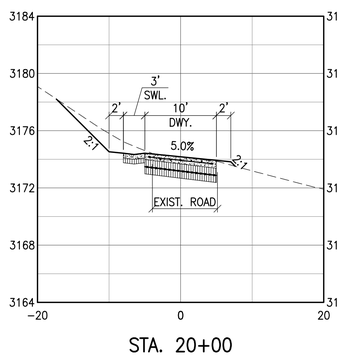

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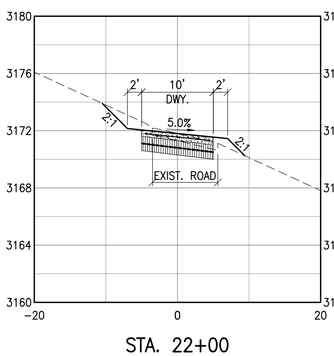

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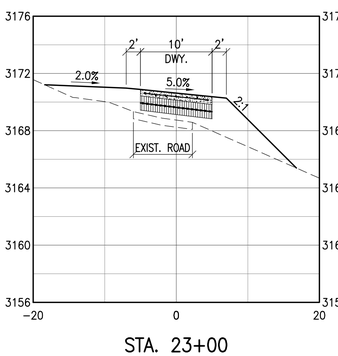


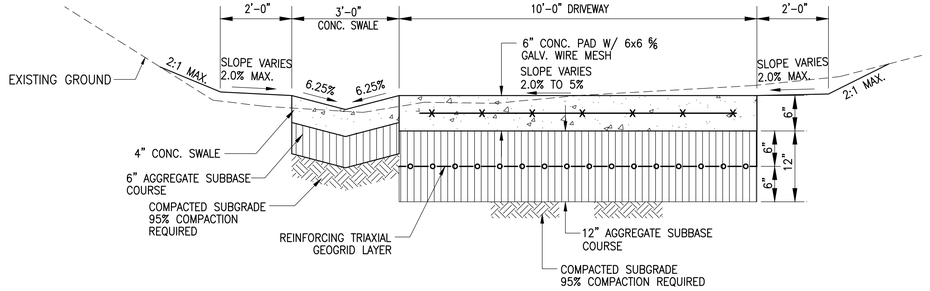
STA. 23+00

CROSS SECTIONS

SCALE: HORIZ: 1"=10'
VERT.: 1"=5'

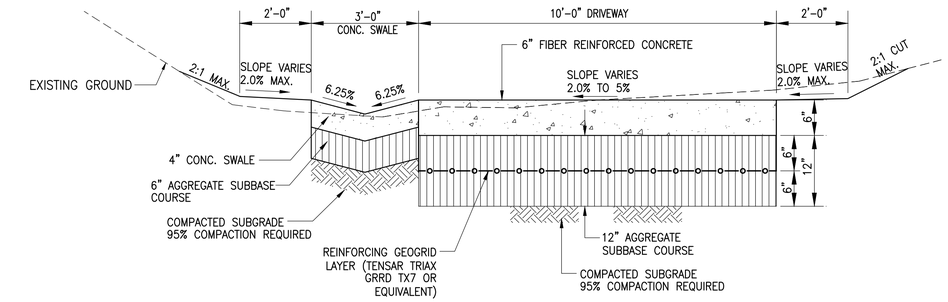
EXIST. GROUND

FINISH GRADE



TYPICAL DRIVEWAY SECTION

NOT TO SCALE



ADDITIVE ALTERNATIVE: FIBER REINFORCED CONCRETE

NOT TO SCALE

NOTES:

1. NEW ROAD PROFILE TO FOLLOW EXISTING GRADE AT ROAD CENTERLINE WHERE EVER POSSIBLE WITH EXCEPTION TO STATIONS 20+50 AND BEYOND.

2. CROSS SLOPE TRANSITIONS:
   STA 7+00 TO 7+50 (5% EAST TO 2% WEST)
   STA 18+00 TO 19+00 (2% WEST TO 5% EAST)

3. ALL DISTURBED AREAS NOT FINISHED WITH A CONCRETE SURFACE SHALL BE VEGETATED THROUGH SEEDING OR USE OF GEOTEXTILE/GEOMAT AS DESCRIBED IN HAWAII DOT CONSTRUCTION BMP FIELD MANUAL (USE MIRAFI 100X OR APPROVED EQUAL).

4. CONCRETE SHALL BE MINIMUM 3500 PSI.

5. FINISHING REQUIREMENTS SHALL BE AS FOLLOWS:

   0−12%: BROOM FINISH TRANSVERSELY

   12−15%: BRISTLE BRUSH FINISHED WITH STEEL TINE GROOVE (TRANSVERSELY)

   >15%: BRISTLE BRUSH FINISHED.

Austin Tsutsumi & Associates, Inc.
Engineers & Surveyors
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WAILUKU, HAWAII 96793
PHONE: 808-244-8044
FAX: 808-242-9163

KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

ADRIENNE W.L.H. WONG
LICENSED PROFESSIONAL ENGINEER
No. 6378
HAWAII, U.S.A.

This work was prepared by me or under my supervision and construction of this project will be under my observation. (Observation of construction as defined in Chapter 16-115 Subchapter 1 Definitions of the Hawaii Administrative Rules "Professional Engineers, Architects, Surveyors, and Landscape Architects.")

SIGNATURE — APRIL 30, 2020 EXP. DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY

Project No:	18-515
Scale:	AS NOTED
Date:	11/22/2019
Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

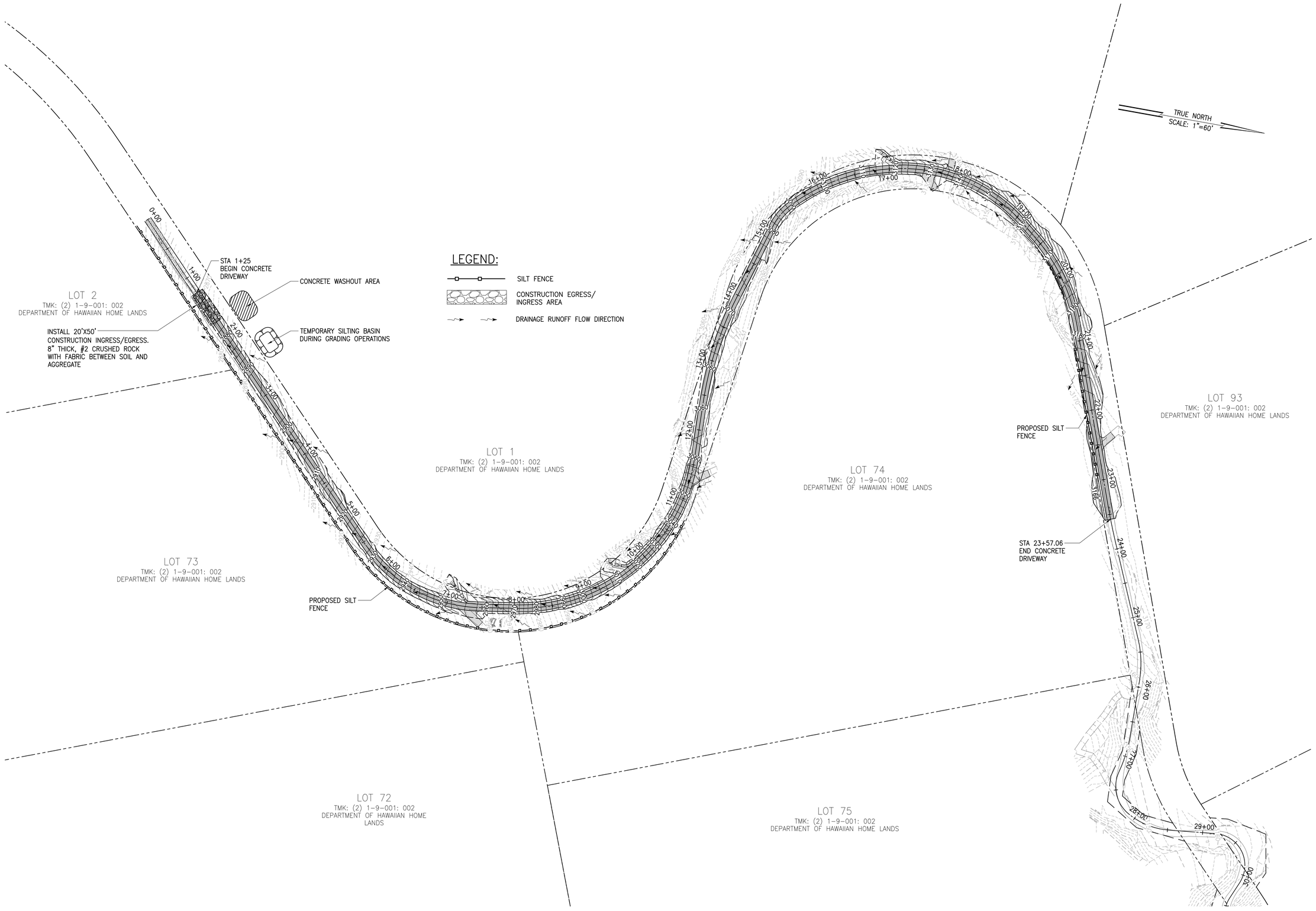
SITE SECTIONS

DWG. NO.

C-4

SHEET 5 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-4 SITE SECTIONS.dwg, November 25, 2019



EROSION CONTROL PLAN

SCALE: 1"=60'

Austin Tsutsumi & Associates, Inc.
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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

ADRIENNE W.L.H. WONG
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Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

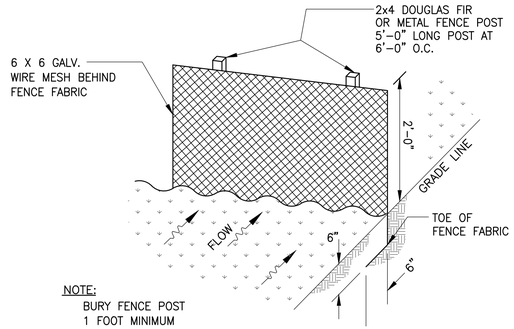
EROSION CONTROL PLAN

DWG. NO.

C-5

SHEET 6 OF 13

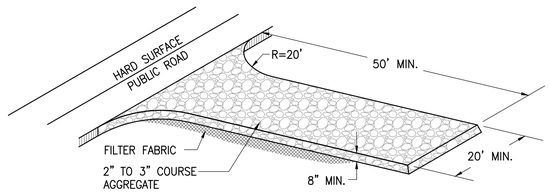
Z:\2018\18-515\ENGINEERING\DWG\C-5 EROSION CONTROL PLAN.dwg; November 25, 2019



NOTE:
BURY FENCE POST
1 FOOT MINIMUM

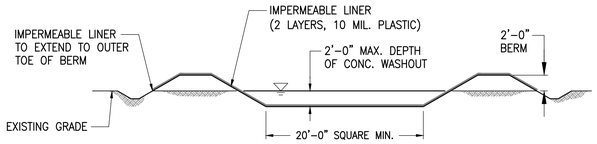
SILT FENCE DETAIL

NOT TO SCALE



CONSTRUCTION EGRESS/ INGRESS DETAIL

NOT TO SCALE



NOTE:

- WASHOUT TO BE INSPECTED, CLEANED AND LINER CHANGED ONCE FILLED TO 75% CAPACITY. RESIDUAL WASTE AND LINER TO BE REMOVED AND HAULED TO APPROVED CONSTRUCTION WASTE LANDFILL.

CONSTRUCTION WASHOUT

NOT TO SCALE

EROSION CONTROL & BEST MANAGEMENT PRACTICE NOTES

BEFORE GRADING AND CONSTRUCTION

THE FOLLOWING PRACTICES WILL BE OBSERVED:

1. POTENTIAL AND ACTUAL POLLUTION SOURCES WITHIN THE EXISTING PROJECT AREA ARE NOT BELIEVED TO BE PRESENT. IF THERE SHOULD BE DISCOVERY OF HARMFUL CONCENTRATIONS OF CONTAMINANTS, THE OPERATOR WILL IMMEDIATELY NOTIFY THE DEPARTMENT OF HEALTH (DOH) SO THAT THE CONTAMINANT CAN BE CURTAILED.

2. SILT FENCING WILL BE ERECTED PRIOR TO THE START OF CONSTRUCTION. SILT FENCING WILL BE INSTALLED TO CONTROL TURBIDITY IMMEDIATELY RESULTING FROM CONSTRUCTION ACTIVITIES. EROSION CONTROL METHODS WILL FOLLOW STANDARD ENGINEERING PRACTICES AND APPLICABLE COUNTY OF MAUI STANDARDS. WHERE NECESSARY, HYDROMULCHING MAY BE USED TO CONTROL EXCESS SILTATION.

3. SOIL CONDITIONS ADJACENT TO THE WORK SITE WILL BE INSPECTED FOR STABILITY PRIOR TO CONSTRUCTION. THE CONTRACTOR WILL BE INSTRUCTED TO AVOID UNSTABLE OR HIGHLY ERODIBLE AREAS FOR STAGING OF CONSTRUCTION EQUIPMENT AND MATERIALS. CRUSHED ROCK MATERIAL AND PLASTIC WILL BE USED TO ADD STABILITY TO STAGING AREAS.

DURING GRADING AND CONSTRUCTION

SHOULD EXCESSIVE RUNOFF OF SEDIMENTS CREATE HIGH TURBIDITY CONDITIONS IN THE DOWNSTREAM AREAS, THE FOLLOWING MEASURES WILL BE UNDERTAKEN:

1. ADDITIONAL HYDROMULCHING MAY BE USED TO STABILIZE NEW AND EXISTING GROUND AREAS SUBJECT TO EROSION AND SILTATION.

2. EROSION CONTROL MEASURES, AS OUTLINED IN THE EROSION CONTROL PLAN, MAY BE AUGMENTED WITH THE ADDITIONAL CONSTRUCTION OF BERMS AND SEDIMENT TRAPS TO INCREASE THE SYSTEM CAPACITY. IMPROVEMENTS TO BE IN ACCORDANCE WITH STANDARD ENGINEERING PRACTICE AND APPLICABLE COUNTY OF MAUII STANDARDS. ADDITIONAL BERMS WILL BE CONSTRUCTED OF CRUSHED ROCK WRAPPED IN GEOTECH FABRIC.

3. REMOVED VEGETATION WILL BE PROPERLY DISPOSED AT AN APPROVED DISPOSAL SITE OR LANDFILL.

4. DISCHARGES ASSOCIATED WITH THE OPERATION AND MAINTENANCE OF EQUIPMENT WILL BE FIELD MONITORED BY THE CONTRACTOR AND CONSTRUCTION INSPECTOR. ANY MECHANICAL AND HYDRAULIC FLUID LEAKAGE WILL BE REPAIRED AS SOON AS IT IS IDENTIFIED AND LOCATED. LARGE LEAKAGE OF MECHANICAL FLUIDS WILL BE CONTAINED, PROPERLY DISPOSED, AND NOT ALLOWED TO IMPACT STATE WATERS.

5. ANY NON-STORM WATER DISCHARGES SUCH AS HYDROTESTING EFFLUENT, WASHWATER FROM CONSTRUCTION EQUIPMENT AND CONCRETE TRUCKS WILL BE DIVERTED AND DEPOSITED INTO PROCESS WATER BASINS THAT WILL BE UNDERLAYED WITH AN IMPERMEABLE LINER. ANY LEFTOVER CONCRETE DEBRIS WILL BE DISPOSED OF AT AN APPROPRIATE FACILITY.

6. DUST CREATED BY CONSTRUCTION ACTIVITY WILL BE CONTROLLED BY WATERING WITH WATER WAGON AND AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH, AND COUNTY GRADING ORDINANCE.

AFTER CONSTRUCTION ACTIVITIES

REGULAR MAINTENANCE DESIGNED TO ENSURE THE LONG-TERM EFFICIENCY OF THE SYSTEM WILL INCLUDE:

1. THE REMOVAL AND RECLAMATION OF SEDIMENTS THAT ACCUMULATE IN THE DRAINAGE SYSTEM AND VEGETATED SWALE, APPROXIMATELY EVERY 6 MONTHS OR SOONER FOLLOWING HEAVY STORM CONDITIONS. THE RECLAIMED SEDIMENTS WILL BE USED FOR FILL, AS A SUPPLEMENT TO TOPSOIL, AND FOR OTHER USES OVER VARIOUS PORTIONS OF THE PROJECT.

2. DRAINAGE SWALES AND OTHER STORM CONTROL STRUCTURES WHICH ARE LINED WITH GRASS SHALL BE PERIODICALLY INSPECTED AND MAINTAINED.

MISCELLANEOUS GRADING NOTES

AT A MINIMUM, DISTURBED AREAS OF CONSTRUCTION SITE THAT WILL NOT BE REDISTURBED FOR TWENTY-ONE CALENDAR DAYS OR MORE WILL BE STABILIZED (GRASSED OR GRAVELED) BY NO LATER THAN THE FOURTEENTH CALENDAR DAY AFTER LAST DISTURBANCE.

DUST NUISANCE

1. THE CONTRACTOR AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL CONFORM WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH, AND THE COUNTY OF MAUI.

2. THE CONTRACTOR SHALL PROVIDE DUST CONTROL SPRINKLERS, AND/OR WATER-WAGONS AS NECESSARY, WEEKENDS, AND HOLIDAYS INCLUDED. ALL GRADED AREAS SHALL BE THOROUGHLY WATERED AFTER CONSTRUCTION ACTIVITY HAS CEASED FOR THE DAY.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESPONDING TO DUST COMPLAINTS FROM NEIGHBORING PROPERTIES AND WILL PROVIDE ADDITIONAL MITIGATION MEASURES AS NECESSARY.

NOTES:

SPECIAL CONDITIONS FOR LAND DISTURBANCES

THE FOLLOWING SPECIAL CONDITIONS APPLY TO ALL LAND DISTURBANCE WORK CONDUCTED UNDER THIS GENERAL PERMIT:

(A) CONSTRUCTION MANAGEMENT TECHNIQUES

(1) CLEARING AND GRUBBING SHALL BE HELD TO THE MINIMUM NECESSARY FOR GRADING AND EQUIPMENT OPERATION.

(2) CONSTRUCTION SHALL BE SEQUENCED TO MINIMIZE THE EXPOSURE TIME OF THE CLEARED SURFACE AREA.

(3) CONSTRUCTION SHALL BE STAGED OR PHASED FOR LARGE PROJECTS. AREAS OF ONE PHASE SHALL BE STABILIZED BEFORE ANOTHER PHASE IS INITIATED. STABILIZATION SHALL BE ACCOMPLISHED BY TEMPORARILY OR PERMANENTLY PROTECTING THE DISTURBED SOIL SURFACE FROM RAINFALL IMPACTS AND RUNOFF.

(4) EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE AND FUNCTIONAL BEFORE EARTH MOVING OPERATIONS BEGIN. THESES MEASURES SHALL BE PROPERLY CONSTRUCTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.

(5) ALL CONTROL MEASURES SHALL BE CHECKED AND REPAIRED AS NECESSARY, FOR EXAMPLE, WEEKLY IN DRY PERIODS AND WITHIN TWENTY-FOUR HOURS AFTER ANY RAINFALL OF 0.5 INCHES OR GREATER WITHIN A 24-HOUR PERIOD. DURING PROLONGED RAINFALL, DAILY CHECKING IS NECESSARY. THE PERMITTEE SHALL MAINTAIN RECORDS OF CHECKS AND REPAIRS.

(6) THE PERMITTEE SHALL MAINTAIN RECORDS OF THE DURATION AND ESTIMATED VOLUME OF STORM WATER DISCHARGE(S).

(7) A SPECIFIC INDIVIDUAL SHALL BE DESIGNATED TO BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROLS ON THE PROJECT SITE.

(B) VEGETATION CONTROLS

(1) PRE-CONSTRUCTION VEGETATIVE GROUND COVER SHALL NOT BE DESTROYED, REMOVED, OR DISTURBED MORE THAN TWENTY CALENDAR DAYS PRIOR TO LAND DISTURBANCE.

(2) TEMPORARY SOIL STABILIZATION WITH APPROPRIATE VEGETATION SHALL BE APPLIED ON AREAS THAT WILL REMAIN UNFINISHED FOR MORE THAN THIRTY CALENDAR DAYS.

(3) PERMANENT SOIL STABILIZATION WITH PERENNIAL VEGETATION OR PAVEMENT SHALL BE APPLIED AS SOON AS PRACTICAL AFTER FINAL GRADING. IRRIGATION AND MAINTENANCE OF THE PERENNIAL VEGETATION SHALL BE PROVIDED FOR THIRTY CALENDAR DAYS OR UNTIL THE VEGETATION TAKES ROOT, WHICHEVER IS SHORTER.

(C) STRUCTURAL CONTROLS

(1) STORM WATER FLOWING TOWARD THE CONSTRUCTION AREA SHALL BE DIVERTED BY USING APPROPRIATE CONTROL MEASURES, AS PRACTICAL.

(2) EROSION CONTROL MEASURES SHALL BE DESIGNED ACCORDING TO THE SIZE OF DISTURBED OR DRAINAGE AREAS TO DETAIN RUNOFF AND TRAP SEDIMENT.

(3) WATER MUST BE DISCHARGED IN A MANNER THAT THE DISCHARGE SHALL NOT CAUSE OR CONTRIBUTE TO A VIOLATION OF THE BASIC WATER QUALITY CRITERIA AS SPECIFIED IN SECTION 11-54-04.

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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

ADRIENNE W.-L.H. WONG
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SIGNATURE — APRIL 30, 2020 EXP. DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY

Project No:	18-515
Scale:	AS NOTED
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Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

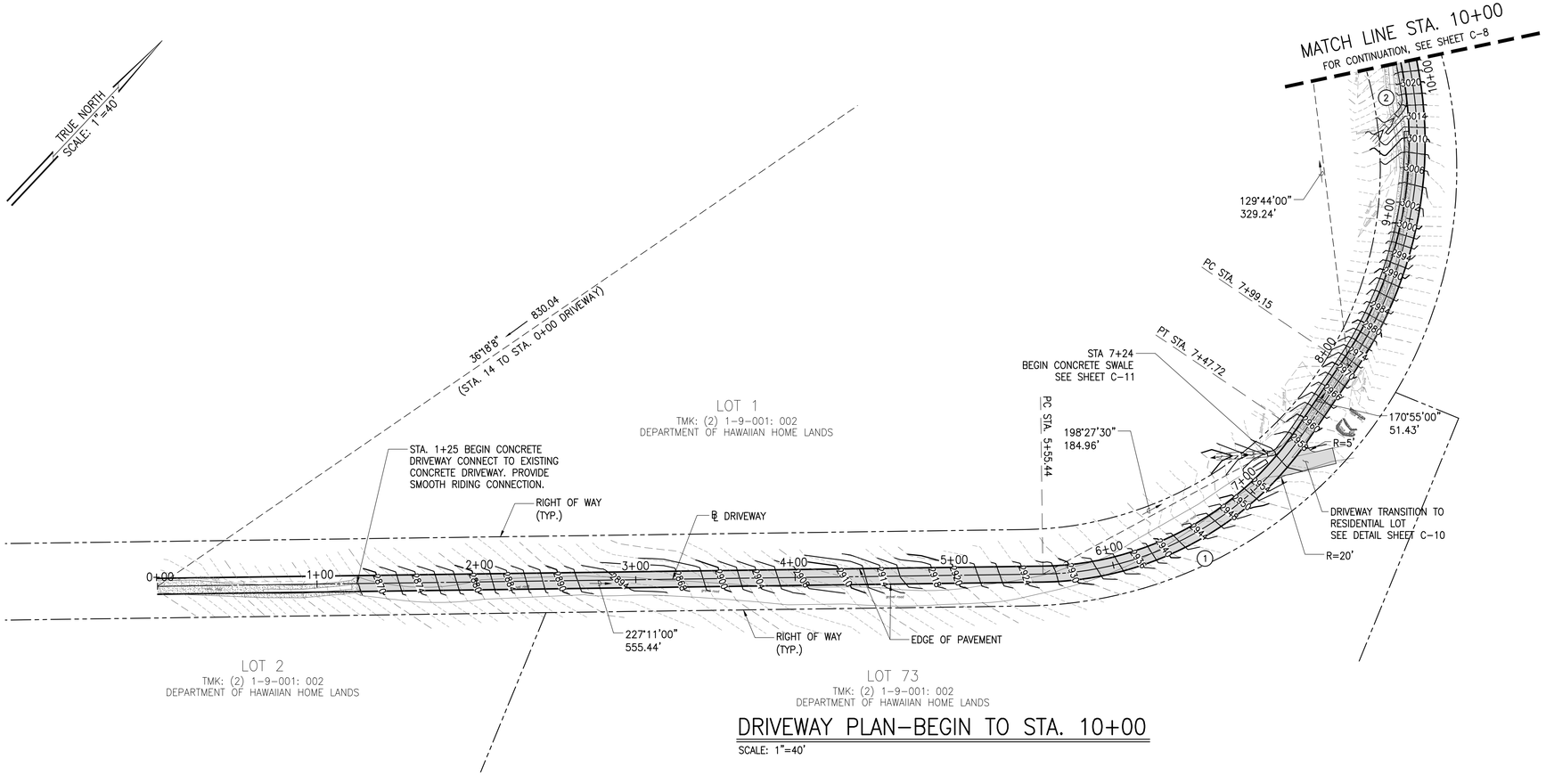
EROSION CONTROL DETAILS & NOTES

DWG. NO.

C-6

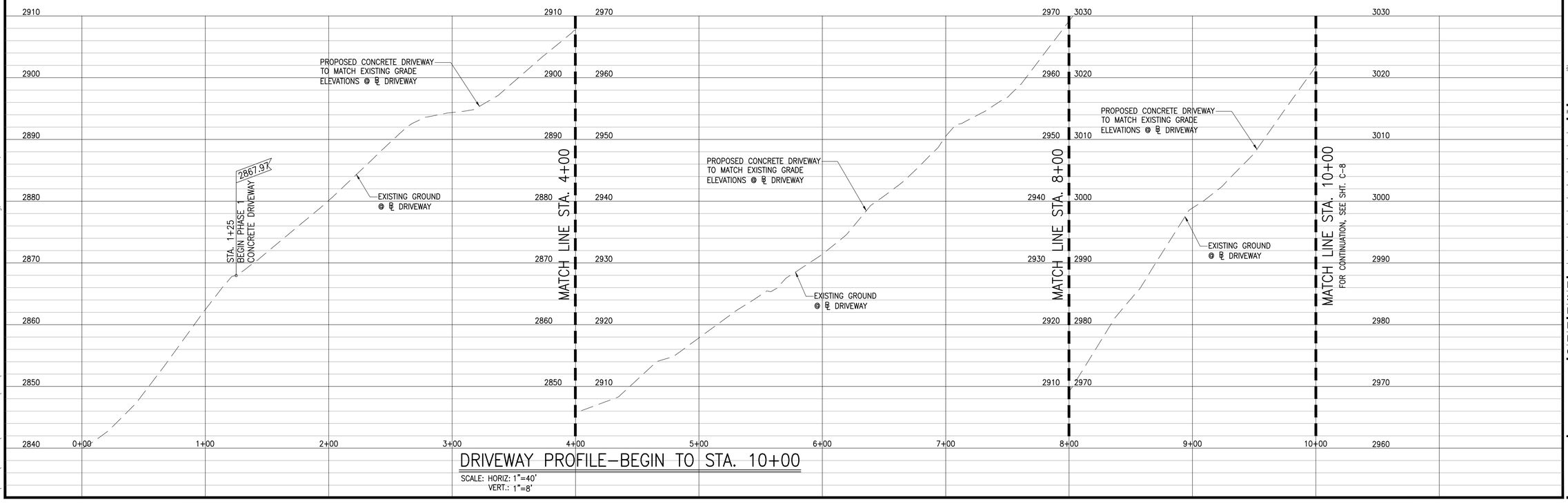
SHEET 7 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-6 EROSION CONTROL DETAILS AND NOTES.dwg, November 25, 2019



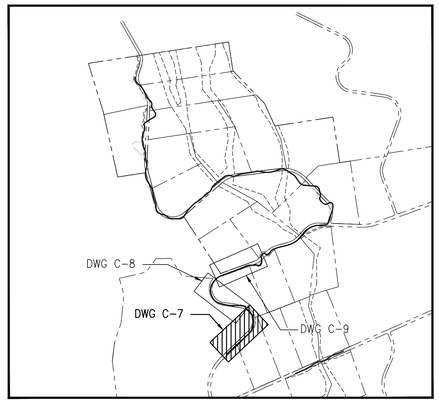
DRIVEWAY PLAN–BEGIN TO STA. 10+00

SCALE: 1"=40'



DRIVEWAY PROFILE–BEGIN TO STA. 10+00

SCALE: HORIZ: 1"=40'
VERT.: 1"=8'



VICINITY MAP

NOT TO SCALE

NOTES:

1. CONTRACTOR SHALL PROVIDE AND MAINTAIN A TEMPORARY BYPASS ACCESS ROAD FOR RESIDENTS AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION.

2. THE CONTRACTOR SHALL COORDINATE WITH SANDWICH ISLES COMMUNICATIONS (SIC) PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION WORK. ALL COMMUNICATIONS SHOULD BE DIRECTLY BETWEEN SIC AND THE CONTRACTOR

℄ CURVE DATA TABLE						
CURVE	Δ	Δ/2	R	T	Ch	Lc
①	55°05'00"	27°32'30"	200.00'	104.30'	184.96'	192.28'
②	82°22'00"	41°11'00"	250.00'	218.73'	329.24'	359.39'

Austin Tsutsumi & Associates, Inc.
Engineers & Surveyors
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WAILUKU, HAWAII 96793
PHONE: 808-244-8044
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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

ADRIENNE W.L.H. WONG
LICENSED PROFESSIONAL ENGINEER
No. 6378
HAWAII, U.S.A.

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SIGNATURE — APRIL 30, 2020 EXP. DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY

Project No:	18-515
Scale:	AS NOTED
Date:	11/22/2019
Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

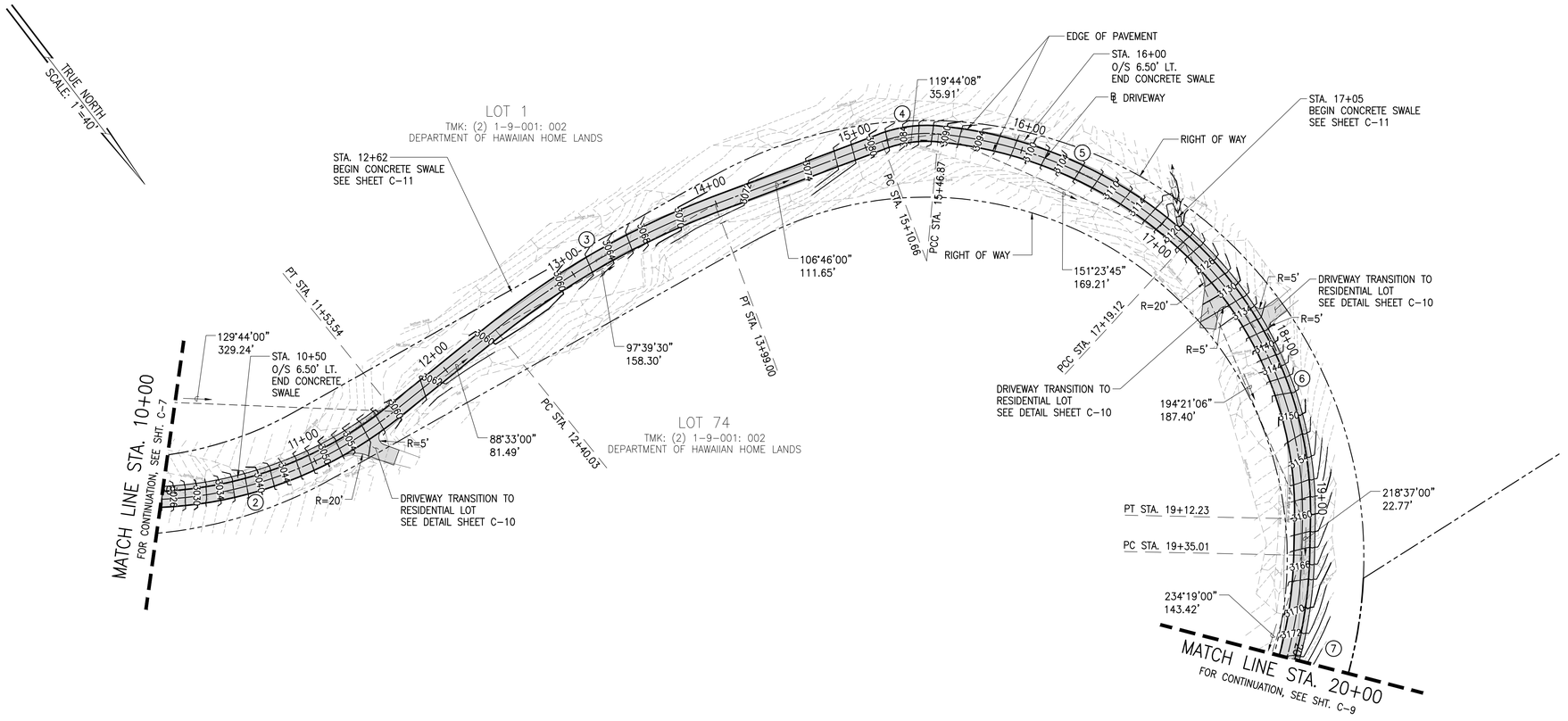
PLAN AND PROFILE BEGIN TO STA. 10+00

DWG. NO.

C-7

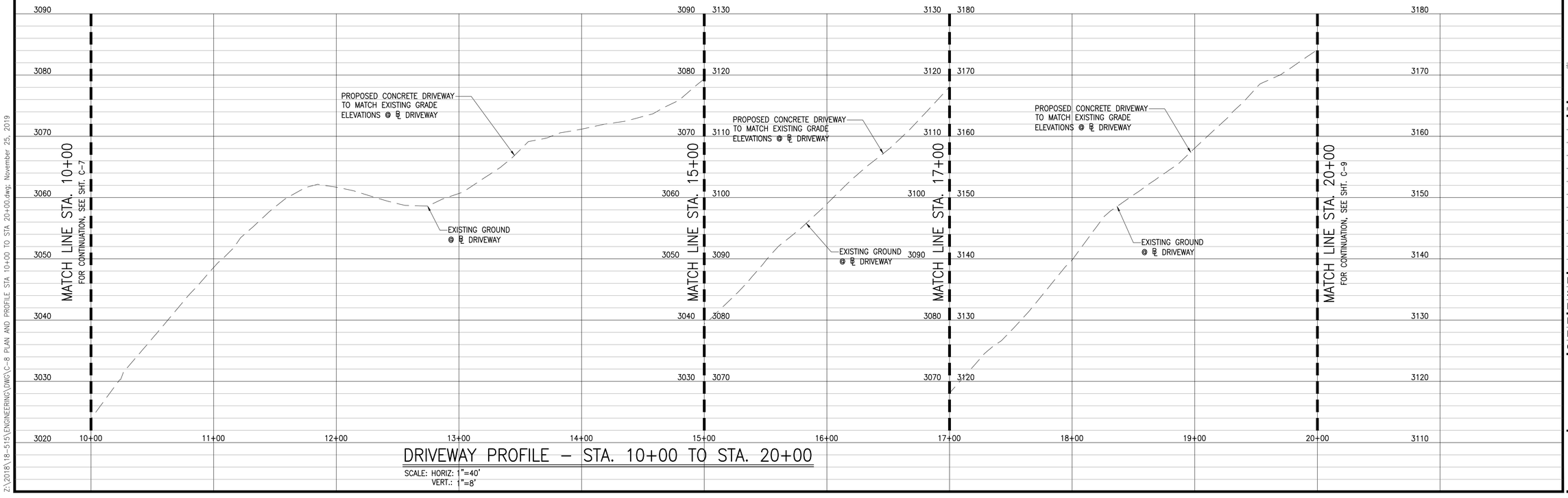
SHEET 8 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-7 PLAN AND PROFILE BEGIN TO STA 10+00.dwg; November 25, 2019



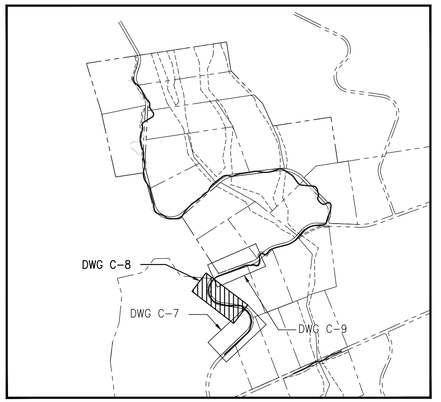
DRIVEWAY PLAN – STA. 10+00 TO STA. 20+00

SCALE: 1"=40'



DRIVEWAY PROFILE – STA. 10+00 TO STA. 20+00

SCALE: HORIZ: 1"=40'
VERT.: 1"=8'



VICINITY MAP
NOT TO SCALE

NOTES:

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2. THE CONTRACTOR SHALL COORDINATE WITH SANDWICH ISLES COMMUNICATIONS (SIC) PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION WORK. ALL COMMUNICATIONS SHOULD BE DIRECTLY BETWEEN SIC AND THE CONTRACTOR

℄ CURVE DATA TABLE						
CURVE	Δ	Δ/2	R	T	Ch	Lc
②	82°22'00"	41°11'00"	250.00'	218.73'	329.24'	359.39'
③	18°13'00"	9°06'30"	500.00'	80.16'	158.30'	158.97'
④	25°56'17"	12°58'08"	80.00'	18.42'	35.91'	36.22'
⑤	37°22'56"	18°41'28"	264.00'	89.31'	169.21'	172.24'
⑥	48°31'47"	24°15'54"	228.00'	102.781'	187.40'	193.12'
⑦	31°24'00"	15°42'00"	265.00'	74.49'	143.42'	145.23'

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Engineers & Surveyors
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PHONE: 808-244-8044
FAX: 808-242-9163

KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

ADRIENNE W.L.H. WONG
LICENSED PROFESSIONAL ENGINEER
No. 6378
HAWAII, U.S.A.

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SIGNATURE

APRIL 30, 2020
EXP. DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY

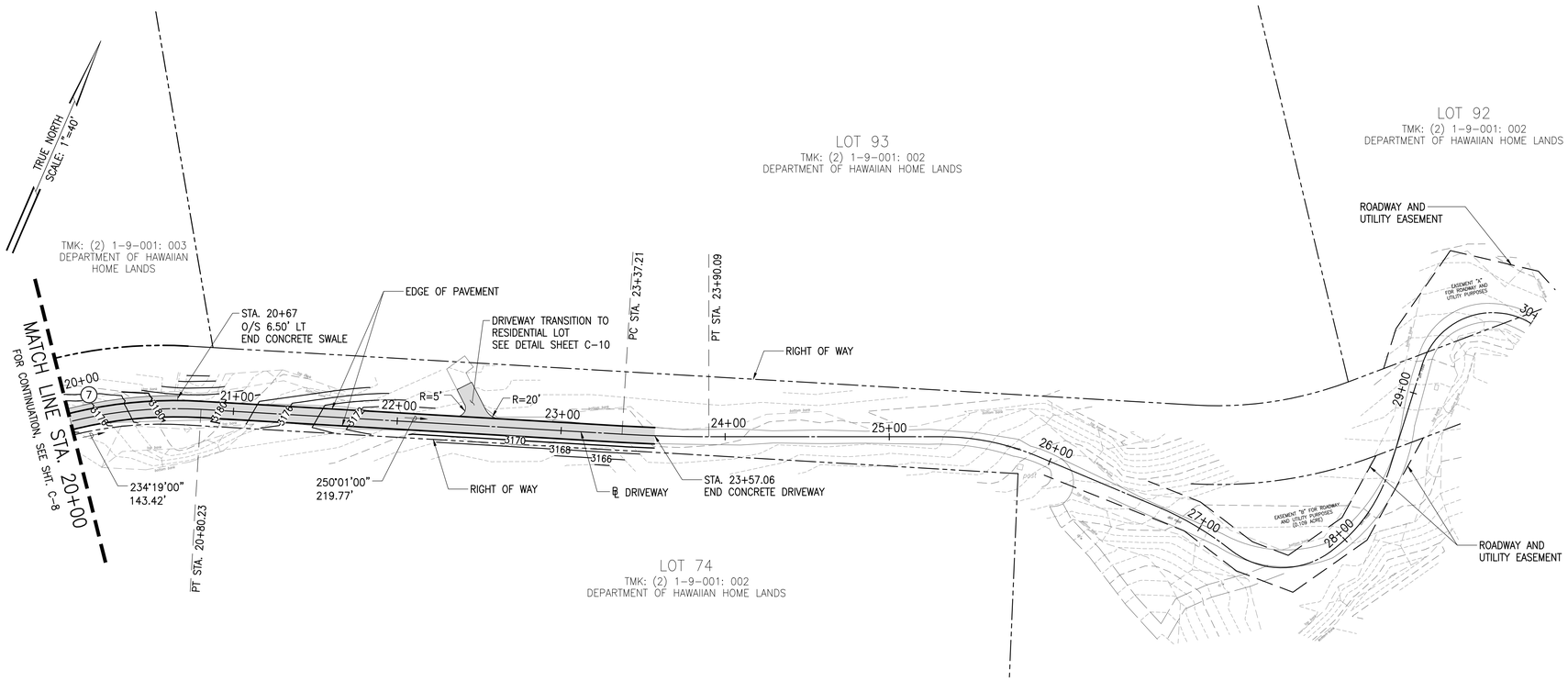
Project No:	18-515
Scale:	AS NOTED
Date:	11/22/2019
Designed By:	JKL
Drawn By:	ATA
Checked By:	AW

PLAN AND PROFILE STA. 10+00 TO STA. 20+00

DWG. NO.

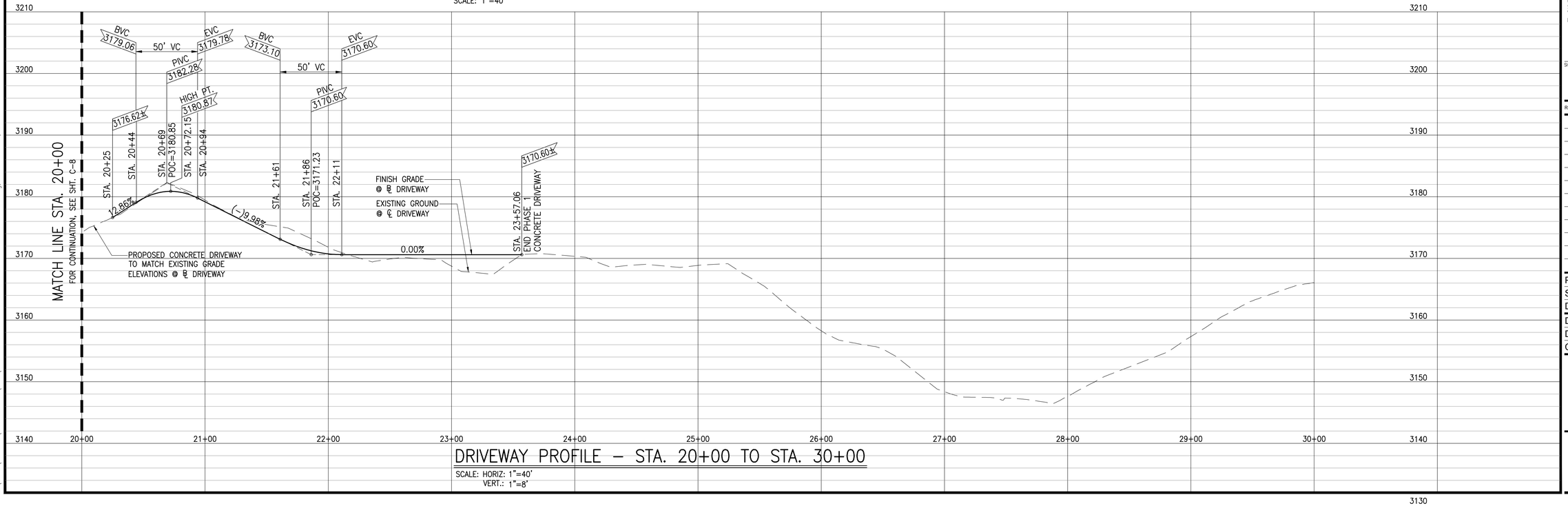
C-8

Z:\2018\18-515\ENGINEERING\DWG\C-8 PLAN AND PROFILE STA 10+00 TO STA 20+00.dwg, November 25, 2019



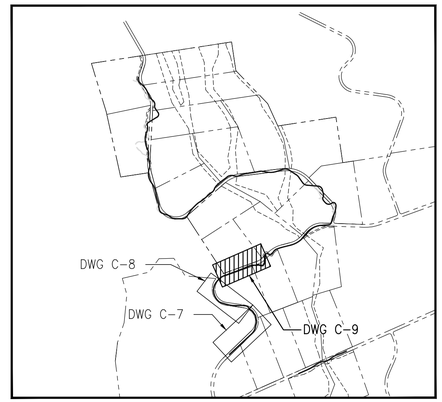
DRIVEWAY PLAN – STA. 20+00 TO STA. 30+00

SCALE: 1"=40'



DRIVEWAY PROFILE – STA. 20+00 TO STA. 30+00

SCALE: HORIZ: 1"=40'
VERT.: 1"=8'



VICINITY MAP
NOT TO SCALE

NOTES:

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℄ CURVE DATA TABLE						
CURVE	Δ	Δ/2	R	T	Ch	Lc
⑦	31°24'00"	15°42'00"	265.00'	74.49'	143.42'	145.23'

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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

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Drawn By:	ATA
Checked By:	AW

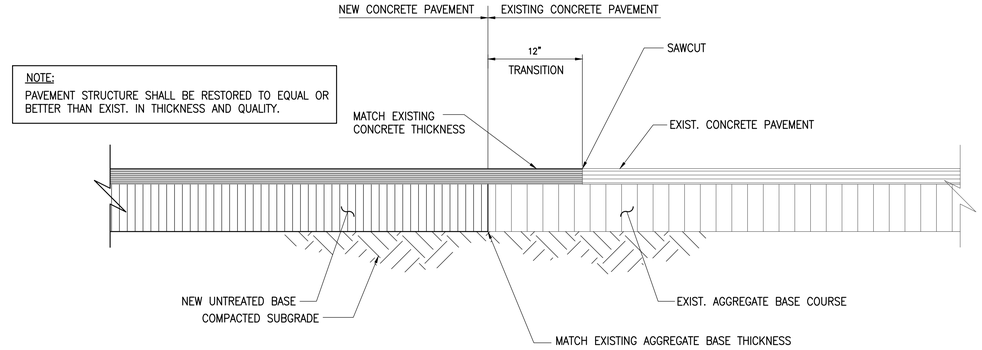
PLAN AND PROFILE STA. 20+00 TO STA. 30+00

DWG. NO.

C-9

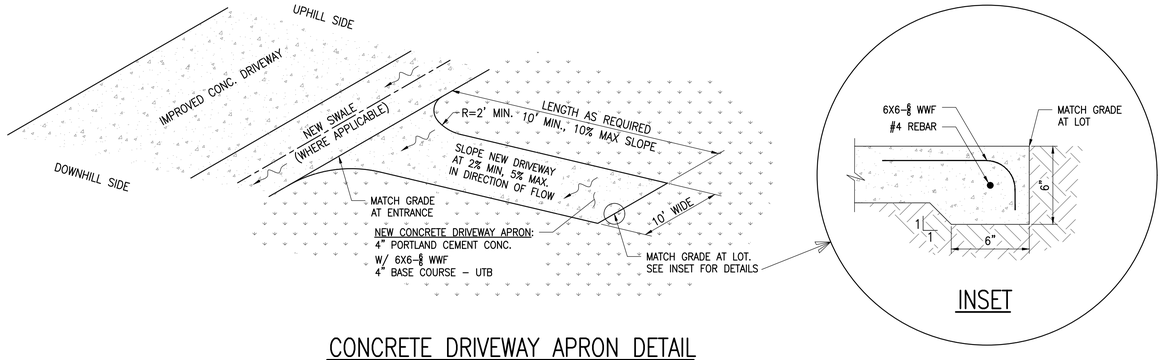
SHEET 10 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-9 PLAN AND PROFILE STA 20+00 TO STA 30+00.dwg, November 25, 2019



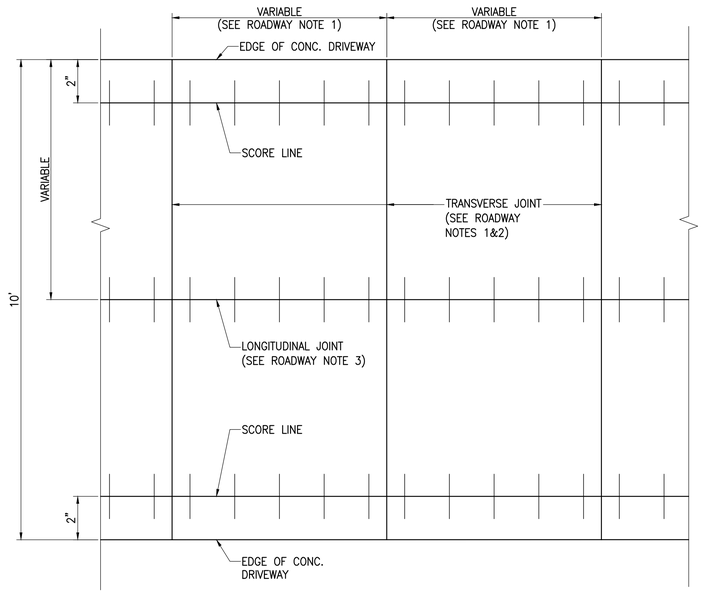
SMOOTH RIDING CONNECTION DETAIL

NOT TO SCALE



CONCRETE DRIVEWAY APRON DETAIL

NOT TO SCALE

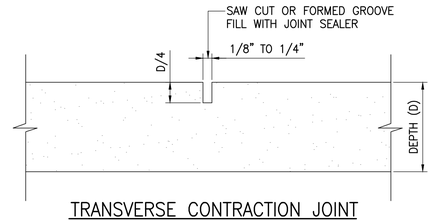


CONCRETE DRIVEWAY INSTALLATION DETAIL

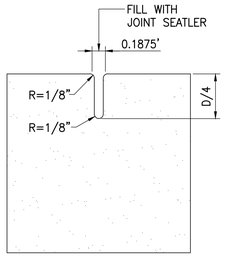
NOT TO SCALE

ROADWAY NOTES:

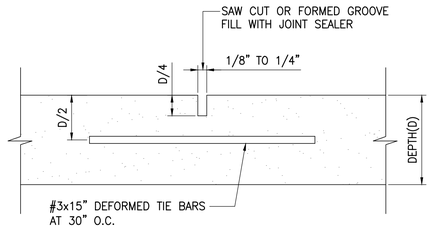
1. TRANSVERSE JOINTS SHALL BE EITHER WEAKENED PLANE CONTRACTION JOINT OR CONSTRUCTION JOINTS WITH DOWELS AND SHALL BE EVENLY SPACED APPROXIMATELY 15 FEET APART.
2. EXPANSION JOINTS WITH DOWELS SHALL BE LOCATE AT INTERSECTION ONLY.
3. LONGITUDINAL JOINTS SHALL BE EITHER WEAKENED PLANE JOINTS OR KEYED CONSTRUCTION JOINTS WITH TIE BARS. MAXIMUM SPACING BETWEEN JOINTS SHALL BE AS PROVIDED IN THE STANDARD SPECIFICATIONS.



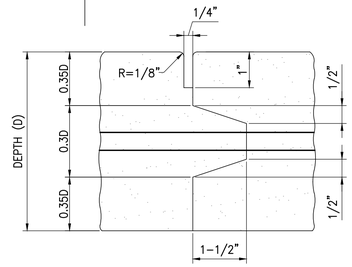
TRANSVERSE CONTRACTION JOINT



DUMMY GROOVE JOINT DETAIL "A"



LONGITUDINAL JOINT



DETAIL "B"

CONSTRUCTION NOTES

1. WEAKENED PLANE JOINTS MAY BE CONSTRUCTED BY SAWING, FORMING DUMMY GROOVE (SEE DETAIL "A") OR INSERTING RIBBON OR PREMOLDED STRIP.
2. ALL JOINTS SHALL BE SIGHTLY UNDER FILLED WITH JOINT SEALER PAVING ASPHALT, GRADE 85–100, AASHTO DESIGNATION: M–20
3. ALL DOWELS SHALL BE PAINT AND GREASED. EXPANSION JOINT DOWELS SHALL BE EQUIPPED WITH METAL CAPS.
4. EXPANSION JOINTS WITHOUT DOWELS SHALL BE CONSTRUCTED AT JUNCTIONS OF CONCRETE PAVEMENT AND RECTANGULAR STRUCTURE.
5. CONSTRUCTION JOINTS AT UNPLANNED LOCATIONS SHALL BE KEYED JOINTS WITH TIE BARS (DETAIL "B").

CONCRETE PAVEMENT JOINT DETAILS

NOT TO SCALE

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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

KAHIKINUI,MAUI

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Checked By:	AW

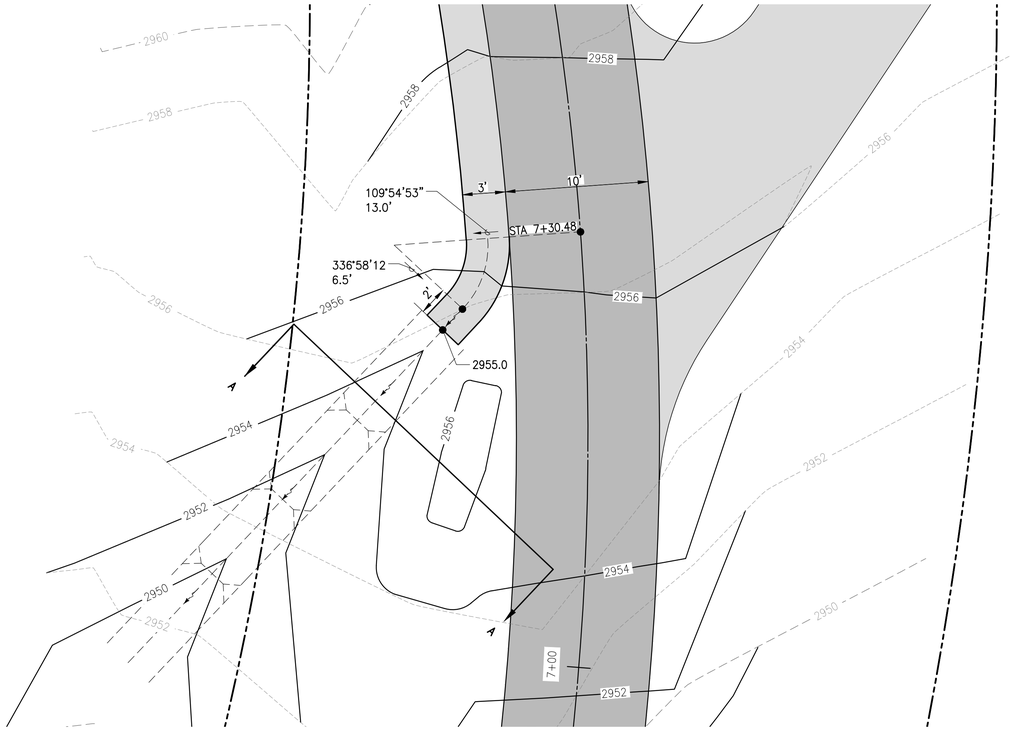
MISCELLANEOUS DETAILS

DWG. NO.

C-10

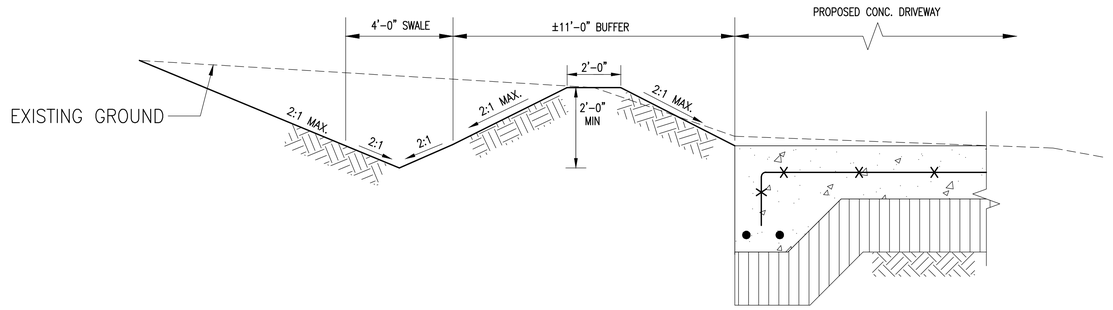
SHEET 11 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-10 MISC. DETAILS.dwg, November 25, 2019



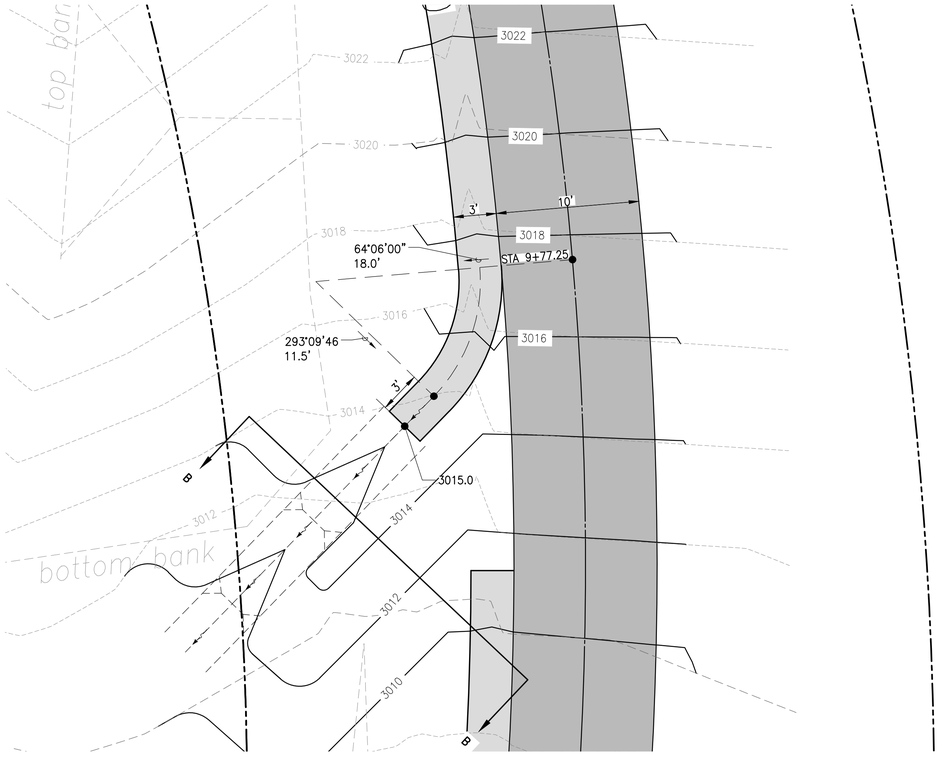
SPILLWAY DETAIL A (STA 7+30.48)

SCALE: 1"=5'



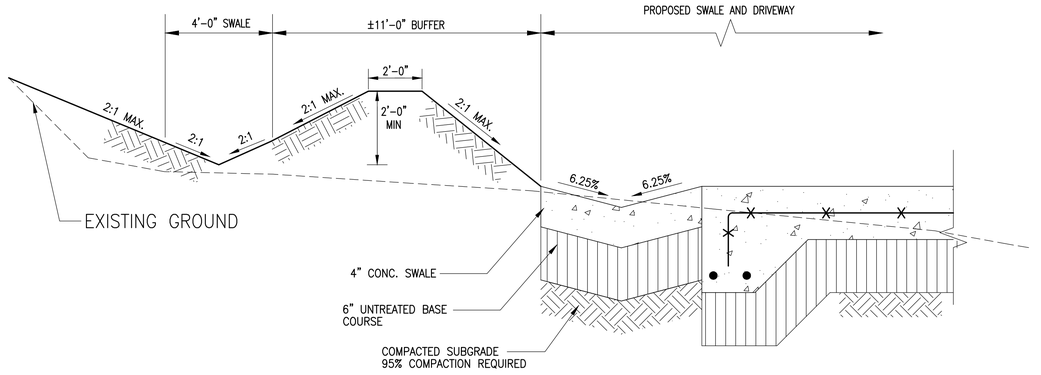
SPILLWAY SECTION A–A

NOT TO SCALE



SPILLWAY DETAIL B (STA 9+77.25)

SCALE: 1"=5'



SPILLWAY SECTION B–B

NOT TO SCALE

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Checked By:	AW

SPILLWAY DETAILS 1

DWG. NO.

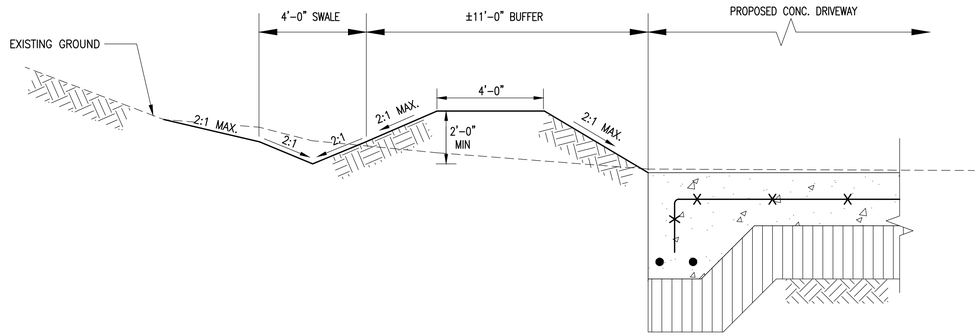
C-11

SHEET 12 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-11 DRAINAGE SPILLWAY DETAILS 1.dwg, November 25, 2019

SPILLWAY DETAIL C (STA 17+11.14)

SCALE: 1"=5'



SPILLWAY SECTION C-C

NOT TO SCALE

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Engineers & Surveyors

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KAHIKINUI DRIVEWAY REPAIRS PHASE 1

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Checked By:	AW

SPILLWAY DETAILS 2

DWG. NO.

C-12

SHEET 13 OF 13

Z:\2018\18-515\ENGINEERING\DWG\C-12 DRAINAGE SPILLWAY DETAILS 2.dwg, November 25, 2019

SPECIFICATIONS

FOR

KAHIKINUI DRIVEWAY REPAIRS – PHASE 1

KAHIKINUI, KULA, MAUI, HAWAII

TMK: 2nd DIVISION 2-9-001:POR. 003

PREPARED FOR

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
91-5420 KAPOLEI PARKWAY
KAPOLEI, HAWAII 96707

BY

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS
HONOLULU • WAILUKU, HAWAII

TECHNICAL SPECIFICATIONS

T A B L E O F C O N T E N T S

GEOTECHNICAL EXPLORATION REPORT FOR KAHIKINUI DRIVEWAY IMPROVEMENTS PROJECT PHASE 1, KAHIKINUI, MAUI, HAWAII

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

A. Site work including driveway construction, swale construction, grading, and erosion control measures all as shown on the plans and specified herein.

1.2 RECORD PLANS

A. Maintain two (2) sets of plans at the job site. Each set shall be marked daily with any changes from the design documents, which are made in the field. Before final payment is made, one set will be forwarded to the Owner with the Contractor's certification that all known field changes are incorporated into the set. The Owner or his representative shall have the right to review the Record Drawings at any time and to require corrections, or additions, if deemed necessary.

1.3 ITEMIZED MATERIAL INVOICES

A. The Contractor shall furnish in duplicate detailed and itemized material invoices giving a complete breakdown of the material cost for the purpose of making monthly partial payments on the materials delivered. The values employed in making up the itemized breakdown will be used only for determining the basis of partial monthly payments, and not be considered as fixing a basis for additions to or deductions from the contract price.

1.4 TRADE NAMES AND ALTERNATIVES

A. For convenience in designation on the plans or in the specifications, certain equipment or articles or materials may be designated under a trade name or the name of a manufacturer and his catalog information. The use of alternative equipment or an article or material which is of equal quality and of the required characteristics for the purpose intended will be permitted, subject to the approval of the Owner, in writing, in accordance with the following requirements. Alternatives will be considered only during the bid phase.

B. The burden of proof as to the comparative quality and suitability of alternative equipment or articles or materials shall be upon the Contractor and he shall furnish, at his own expense, all information necessary or related thereto as required by the Owner. The Owner shall be the sole judge as to the comparative quality and suitability of alternative equipment or articles or materials and his decision shall be final.

C. The above provisions shall not be construed as permitting the use of alternative equipment or articles or materials for equipment or articles or materials which are not designated under a trade name or the name of a manufacturer and his catalog information, and for which the specifications are set forth.

1.5 SANITARY FACILITIES

The following requirements of the Department of Health shall be strictly adhered to:

A. Portable covered receptacles for fecal matter and urine, of the design and number specified by the Division of Environmental Health of the Department of Health shall be provided.

B. No employee will be allowed to deposit fecal matter or urine in any place except in these receptacles. Any infringement of this requirement must result in immediate discharge of the offender.

C. All deposits in these receptacles shall be immediately covered with a chemical solution prescribed by the Division of Environmental Health. These receptacles, with their contents, shall be collected and removed for disposal at the close of each working day. The method of disposal must be satisfactory to the Division of Environmental Health to prevent contamination of any water supply, stream, or other body of water.

D. The receptacles shall be thoroughly cleaned with water and the required chemical solution and returned to their required places for service.

1.6 CONTRACTOR'S SUPERINTENDENT

A. The Contractor shall employ a full time construction superintendent who shall be the Contractor's authorized and responsible agent on the project. This superintendent shall be thoroughly experienced and competent. It shall be the superintendent's duty to cooperate with the Owner and his duly authorized representatives. Superintendent's name and phone number shall be furnished to the Owner.

1.7 SITE VISIT

A. The Owner will arrange for only one supervised pre-bid site visit of the project. Additional site visits may be arranged by the Contractor and DHHL.

1.8 SUBMITTALS

A. General

1. Submittals of shop drawings, operation and maintenance manuals, data requirements and warranties are a part of the specifications and must be fulfilled. Refer to Section 01300, SUBMITTALS for additional requirements, including number of copies to be submitted. Failure of the Contractor to comply with these requirements as set forth may result in final payment being withheld from him. Shop drawings, manuals and data are to be sent under the Contractor's signature to the Owner's Representative for distribution to the Engineer, as follows:

Austin, Tsutsumi and Associates, Inc.
1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793

All shop drawings and data submitted must carry the project number, project title, the contracting agency's name, an appropriate title and, in the case of details, small parts, etc., the name of the basic component.

2. Cost of the shop drawings, manuals and data shall be incidental to the various items called for in these specifications.

3. All hazardous materials delivered to the project site shall be supplied with MSDS data from manufacturer of chemicals, paints, etc.

B. Shop Drawings

1. All shop drawings and/or data must be certified and must be approved by the Owner's Representative and Engineer before fabrication is to start or before the order is to be placed.

2. The shop drawings and data will be reviewed and approved only as to general design. Checking is only for conformance with the design concept of the project and compliance with the information given in the contract documents. This check is general only and shall not relieve or in any respect diminish the responsibility of the Contractor for details of design, dimensions, etc., necessary to proper fitting and construction of the work as required by the contract, for achieving the result and performance specified thereunder, for coordination of the work of all trades, and for complete compliance with the contract documents.

1.9 TEMPORARY UTILITY SERVICES

A. Contractor shall make his own arrangements for and pay for all temporary utilities required for his work. He shall pay all costs associated with connecting and disconnecting the temporary system. The Contractor must make his own arrangements to provide for his potable water requirements.

1.10 STANDARD SPECIFICATIONS

A. The use of the term "County Standard Specifications" in the Agreement Documents means the "Standard Specifications for Public Works Construction, County of Maui", dated September 1986, with all amendments, and as modified in the Technical Specifications.

B. The use of the term "Standard Specifications" in the Agreement Documents means the "Hawaii Standard Specifications for Road and Bridge Construction, State of Hawaii, Department of Transportation, Highways Division," 2005 and current amendments.

C. The measurement and payment paragraphs of the Maui Specifications and Standard Specifications do not apply to this project.

1.11 STANDARD DETAILS

A. The use of the term "County Standard Details" in the Agreement Documents means the "Standard Details for Public Works Construction, County of Maui" dated September 1984 with all amendments.

B. The use of the term ñState Standard Detailsò in the Agreement Documents means the ñStandard Plans, Department of Transportation, Highways Division, State of Hawaii,ò2008 with all amendments.

1.12 DWS STANDARDS

A. The use of the term "DWS Standards", in the Agreement Documents means the County of Maui, Department of Water Supply's "Water System Standards", dated 2002, and all subsequent amendments and additions including those specifically adopted by the County of Maui.

1.13 ABBREVIATIONS

A. The following capitalized abbreviations refer to specifications, standards, or methods of the respective national association. Disregard abbreviations listed herein, but not mentioned in the specifications.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers' Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Moving and Conditioning Association
ANSI	American National Standard Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating & Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
AWPA	American Wood Preservers' Association
CBMA	Certified Ballast Manufacturers' Association
DFPA	Division for Product Approval of the American Plywood Association
Fed. Spec.	Federal Specification
IEEE	Institute of Electrical & Electronics Engineers, Inc.

JIC	Joint Industry Conferences of Hydraulic Manufacturers
MBMA	Metal Building Manufacturers' Association
Mil. Spec.	Military Specification
MSS	Manufacturers' Standardization Society of the Valves and Fittings Industry
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NLMA	National Lumber Manufacturers' Association
NSF	National Science Foundation
NWMA	National Wood Manufacturers' Association
OECI	Overhead Electrical Crane Institute
RLM	RLM Standards Institute, Inc.
SMACNA	Sheet Metal and Air-Conditioning Contractors' National Association
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
TEMA	Tubular Exchanger Manufacturers' Association
UBC	Uniform Building Code
UL	Underwriters' Laboratories, Inc.
WWPA	Western Wood Products Association

B. The numbers and letters following the abbreviation denote the association's serial designation for the specification or standard to which reference is made. Unless a particular issue is designated, all references to the above specifications, standards, or methods, in each instance, refer to the issue in effect (including all amendments) on the date of the Request for Contract Sum.

1.15 CONTRACTOR'S STORAGE

A. The Contractor is required to make his own arrangements for a site to store and handle his materials and equipment as approved by the Owner. Onsite storage should be available.

1.16 CONTRACTOR'S PARKING

A. The Contractor is solely responsible for whatever arrangements he makes for employee parking. The Owner will not police, control or otherwise manage Contractor's parking nor will the Owner make any arrangements for a Contractor's parking area. If the Contractor chooses to permit his employees to park on the site, he is solely responsible for all claims made relative to these

vehicles. The Contractor shall fully restore all on-site areas used for parking. The Contractor shall repair all environmental damage caused by the vehicles.

1.17 DISCREPANCIES

A. The following principles shall govern the settlement of disputes which may arise over discrepancies in the contract documents.

1. As between figures given on drawings and the scaled measurements, the figures shall govern.

2. As between large-scale drawings and small-scale drawings, the larger scale shall govern.

3. As between drawings and specifications, the requirements of the specifications shall govern. Discrepancies noted shall be reported to the Engineer and the Owner's Representative.

1.18 BOUNDARIES AND BENCH MARKS

A. The Contractor is responsible for the following: 1) employ a licensed professional surveyor to confirm and define the work limits; 2) erect substantial bench marks and preserve them throughout the work; 3) establish and maintain all other grades, lines, levels and bench marks; and 4) verify all grades, lines, levels and dimensions as shown on the drawings and report any errors or inconsistencies in the above to the Owner's Representative and Engineer before commencing work. The Contractor shall be responsible for maintaining the existing physical property boundary points, and shall have any such points removed by the work, restaked by the licensed professional surveyor.

1.19 MEASUREMENTS AND DIMENSIONS

A. Before ordering materials or doing work which is dependent on the proper size of installation, and based upon coordination with existing conditions, the Contractor shall verify all dimensions by taking measurements at the site and shall be responsible for the corrections of same. No consideration will be given to any claim based on differences between the actual dimensions and those indicated on the drawings. Any discrepancies between the drawings and/or the specifications and the existing conditions shall be referred to the Owner's Representative and Engineer for adjustment before any work affected thereby is begun.

1.20 REMOVAL – EQUIPMENT AND DEBRIS

A. The Contractor shall remove all equipment, temporary buildings and unused materials and rubbish resulting from his operation without delay and leave the premises in first class condition.

1.21 REMOVAL – EXISTING UNSUITABLE MATERIALS

A. The cost of the removal of existing unsuitable materials and replacement with suitable material in areas to receive engineered fill, and under structures, pipes, ditches and appurtenances as ordered by the Geotechnical Engineer shall be considered as incidental work to the various contract items. The Owner's Representative will not make additional or separate payment.

1.22 PRESERVATION AND RECOVERY OF HISTORICAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

A. Preservation and recovery of historical, archaeological and cultural resources is the responsibility of the Owner. The Owner, in joint with the Contractor, shall, as its first construction activity, conduct an archaeological investigation under the direction of the Archaeological Consultants for this project. Such activity shall be conducted in compliance with Federal, State or County permit requirements.

B. Should any significant historic, archaeological or cultural remains be located, the Contractor shall notify the Owner, who, in cooperation with the State Historic Preservation Division, will develop and carry out plans to recover the resources and mitigate any adverse effects on the project.

C. If, during excavation, any previously unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. These resources or cultural remains (prehistoric or historic surface or subsurface) include, but are not limited to, any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rocks or coral alignments, pavings, walls or other constructed features; and any indication of agricultural or other uses. Upon such discovery or find, the Contractor shall immediately notify the Owner, and Archaeological Consultant who will initiate action so that prompt and proper data recovery can be undertaken.

1.23 DELAYS BEYOND CONTRACTORÕS CONTROL

A. For delays affecting the critical path caused by Acts of God, or the public enemy, fire, floods, epidemics, quarantine restrictions, labor disputes, freight embargoes and other reasons beyond the Contractorõs control, the Contractor may be granted an extension of time provided that:

1. The Contractor notifies the Ownerõs Representative in writing within five (5) work days after the occurrence of the circumstances described above and states the possible effects on the completion date of the contract.

2. The Contractor submits to the Ownerõs Representative within ten (10) work days after the request a written statement describing the delay to the project. The extent of delay must be substantiated as follows:

a. State specifically the reason or reasons for the delay and fully explain in a detailed chronology the effect of this delay to the work and/or the completion date.

b. Submit copies of purchase order, delivery tag, and any other pertinent documentation to support the time extension request.

c. Cite the period of delay and the time extension requested.

d. A statement either that the above circumstances have been cleared and normal working conditions restored as of a certain

day or that the above circumstances will continue to prevent completion of the project.

3. Time extensions shall be the exclusive relief granted and no additional compensation will be paid the Contractor for such delays.

B. For delays beyond the control of the Contractor in obtaining necessary permits, one day extension for each day delay may be granted by the Owner's representative provided the Contractor notifies the Owner's representative that the permits are not available as soon as the delay occurs. Time extensions shall be the exclusive relief granted on account of such delays. No additional compensation will be paid for these time extensions.

C. For delays in delivery of materials and/or equipment which occur as a result of unforeseeable causes beyond the control and without fault or negligence of both the Contractor, its subcontractor(s) or supplier(s), the Contractor may be granted an extension of time provided that it complies with the following procedures:

1. The Contractor must notify the Owner's representative in writing within five (5) consecutive working days after it first has any knowledge of delays or anticipated delays and state the effects such delays may have on the completion date of the contract.

2. The Contractor must submit to the Owner's representative with ten (10) working days after a firm delivery date for the material and equipment is established a written statement as to the delay to the progress of the project. The delay must be substantiated as follows:

a. State specifically the reason or reasons for the delay. Explain in a detailed chronology the effect of this delay to the on the work and/or the completion date.

b. Submit copies of purchase order(s), factory invoice(s), bill(s) of lading, shipping manifest(s), delivery tag(s) and any other pertinent correspondence to support the time extension request.

c. Cite the start and end date of the delay and the days requested therefore. The delay shall not exceed the difference between the originally scheduled delivery date versus the actual delivery date.

3. Time extensions shall be the exclusive relief granted and no additional compensation will be paid the Contractor on account of such delay.

1.24 WORK OF AND CHARGES BY UTILITIES

A. The Contractor shall be responsible for scheduling and coordinating the work with the utility companies and applicable Governmental agencies for permanent service installation and connections or modifications to existing utilities. The Contractor shall make available all portions of the work necessary for the utility companies to complete their work. The Owner shall not bear the risk of any damage to the contract work caused by any utility company, and work of repairing such damage and delay costs must be resolved between the Contractor and the utility company and their insurers. Contractor charges for

overhead, supervision, coordination, profit, insurance and any other incidental expenses associated with work performed by the utility companies or government agencies shall be included in the Contract Sum whether the utility is paid directly by the Owner or by an allowance item in the contract.

1.25 OCCUPANCY AND WORK BY OTHERS

A. The Contractor understands and confirms the Owner's rights to beneficial occupancy of portions of the project prior to completion of the entire project, to let separate contracts, to expect the cooperation of the Contractor with the Owner, with other contractors of the Owner, and with such others as the Owner may direct. The Contractor understands that the Owner's exercise of these rights shall not cause an increase in the Contract Sum and Contract Time, shall not be construed to be an acceptance of the work by the Owner and/or the Owner's representative and shall not operate to constitute a waiver of claims which the Owner may have against the Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END SECTION

SECTION 01170 - GENERAL PROJECT PROVISIONS

PART 1 - GENERAL

1.1 PRIORITY OF LOCAL STANDARDS

A. State of Hawaii, Standard Specifications for Road and Bridge Construction, 2005 edition with all current amendments governs all work within the State of Hawaii Right-of-Way and all other parts of the project unless otherwise noted.

B. The State Highway Standard Plans as referenced on the drawings govern all work in the State of Hawaii Right-of-Way.

C. The Standard Details for Public Works Construction, County of Maui, 1984 with all current amendments governs work outside the State of Hawaii Right-of-Way.

D. The Water System Standards of the Department of Water Supply, County of Maui with all current revisions govern the potable water and fire protection system.

E. All concrete work unless specified otherwise herein shall be in accordance with all of the provisions of the ACI 301-(latest edition), ñSpecifications for Structural Concrete for Buildings,ò ACI 318-(latest edition), ñBuilding Code Requirements for Reinforced Concrete,ò and ACI 347-(latest edition), ñRecommended Practice for Concrete Formwork.ò

F. Where there is a conflict between technical matters included in these documents and the Standard Drawings and Specifications, or other portions of these documents, the more stringent, in the opinion of the Ownerôs Representative and Engineer, shall apply.

G. Where there is a conflict between this section and other individual specification sections, the latter shall govern. Requirements of this section shall apply to all equipment and work unless otherwise stated in individual specifications.

H. Payment for all work of Division 1 shall be considered incidental and payment will be understood to be included as part of the lump sum bid price in the Construction Agreement.

1.2 RELATED WORK

A. Delivery, Storage and Handling are included in Section 01600.

1.3 QUALIFICATIONS/QUALITY CONTROL

A. All equipment furnished shall consist of standard equipment of proven ability, modified as required for the requirements of these Contract Documents.

B. All suppliers and installers shall be properly experienced, reputable, qualified and regularly engaged in the manufacturing of the equipment to be furnished.

C. All equipment shall be designed, constructed and installed in accordance with best practices and methods and shall operate satisfactorily as determined by the Ownerôs Representative when installed as shown on the Drawings and/or specified.

D. The Contractor shall have sole responsibility for proper functioning of the equipment.

1.4 RIGHT TO KNOW LAW

A. The Contractor shall submit, as required, to the Owner's Representative any Material Safety Data Sheets for all substances or mixture of substances used on the Project by him or his subcontractors prior to commencing any work in accordance with any Federal, State, or local County requirements, if so required.

1.5 HURRICANE PREPAREDNESS PLAN

A. Within 30 days of the Effective Date of the Agreement, submit to the Owner's Representative, a Hurricane Preparedness Plan. The Plan shall describe in detail the necessary measures which the Contractor will perform, at no additional cost to the Owner, in case of a hurricane warning. Revise Plan as required by the Owner's Representative and/or Owner.

B. In the event of inclement weather, the Contractor shall protect the work and materials from damage or injury from the weather. If, in the opinion of the Owner's Representative, any portion of the work or materials has been damaged by reason of failure on the part of the Contractor to so protect the work, such work and materials shall be removed and replaced with new materials and work to the satisfaction of the Owner's Representative.

PART 2 - PRODUCTS

2.1 MATERIAL AND EQUIPMENT

A. These specifications specify certain features, but do not purport to cover all details of construction of the items. However, the Contractor shall furnish and install the mechanisms and/or systems complete in all details and ready for operation when external connections are made. Where components standard with the manufacturer are not specifically mentioned, such components shall be provided and incorporated in the work as if they had been completely described or detailed, at no additional cost to the Owner.

B. Design and fabrication of structural steel members shall be in accordance with the latest edition of AISC "Specifications for Structural Steel Buildings." Where galvanizing is specified, zinc coating shall be applied in accordance with ASTM A123 or ASTM A153 as applicable. All welding shall conform to the applicable standards of the American Welding Society.

C. All parts shall be amply proportioned for all stresses which may occur during fabrication, erection, and operation. All parts of the same size and type shall be identical.

2.2 SLEEVES AND OPENINGS

A. The Contractor shall provide all openings, channels, chases, etc., in new construction and furnish and install anchor bolts, sleeves, inserts, hangers, and other items to be embedded in concrete, as required to complete the work under

this Contract. The Contractor shall do all cutting, coring and rough and finish patching required in existing construction for the work of all trades.

2.3 BOLTS, NUTS AND WASHERS FOR EQUIPMENT

A. Bolts for the equipment assembly shall be of Type 316 stainless steel, except that where the equipment body is aluminum or a bronze alloy, the bolts shall be of the same material. Hexagonal nuts shall be of the same metal as the bolts. All threads shall be clean cut, coarse threads, Class II fit, and shall conform to U.S. Standard BL 1-1060 for United Screw Threads.

B. Bolts, nuts, and washers shall be Type 316 stainless steel, unless indicated otherwise.

C. Bolts and hardware for making up joints in pipe work shall be as specified herein, unless specified in the individual appropriate section.

2.4 PIPING SYSTEM UNIONS

A. Unions shall be installed in the piping systems where they are required to facilitate the removal of equipment, valves and other appurtenances as directed by the Owner's Representative whether they are shown specifically on the drawings or not.

B. Unions shall be made of a material that is compatible with the piping system they are to be installed in, shall be the same size as the piping they are installed in, and shall be of a standard design.

2.5 PROTECTION IN SHIPMENT AND STORAGE

A. All materials and equipment to be installed under the Contract shall be properly prepared and crated for shipment and handling during shipment and storage to prevent damage. Protective coatings and wrappings shall be removed and material and equipment cleaned immediately prior to painting for final inspection.

END SECTION

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies the general methods and requirements of submissions applicable to the following work-related submittals: shop drawings, product data, samples and construction or submittal schedules. Additional general submission requirements are found in Sections 01010. Detailed submittal requirements are specified in the technical specification sections.

1.2 RELATED WORK

A. Construction schedule is included in Section 01311.

1.3 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings

1. Shop drawings, as defined in the General Conditions, and as specified in individual work sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the work.

2. The Contractor shall be responsible for submission in sufficient time to allow ten (10) working days for checking by the Owner's Representative and Engineer without causing delays in delivery of materials.

3. The Contractor shall check all shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the drawings and specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements; such measurements shall be made and noted on the drawings before being submitted for approval.

B. Product Data: Product data as specified in individual sections include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill

reports, product operating and maintenance instructions and recommended spare parts listing, and printed product warranties, as applicable to the work.

C. Samples: Samples specified in individual sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Ownerôs Representative for independent inspection and testing, as applicable to the Work.

1.4 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements.

2. Field construction criteria.

3. Catalog numbers and similar data.

4. Conformance with the specifications.

B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following certification statement including the Contractor's company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11 inches x 17 inches and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Ownerôs Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Ownerôs Representative.

C. The Contractor shall utilize a 9-character submittal identification numbering system in the following manner:

1. The first five digits shall be the applicable specification section number.

2. The next three digits shall be the numbers 001-999 to sequentially number each initial separate item or drawing submitted under each specific section number.

3. The last character shall be a letter, A-Z, indicating the submission, or resubmission of the same Drawings, i.e., A=1st submission, B=2nd submission, C=3d submission, etc. A typical submittal number would be as follows:

03300-008-B

03300 = Specification Section for Concrete

008 = The eighth initial submittal under this specification section

B = The second submission (first resubmission) of that particular shop drawing

D. Notify the Owner's Representative and Engineer, in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.

E. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased, or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

F. Project work, materials, fabrication and installation shall conform to approved shop drawings, applicable samples, and product data.

1.5 SUBMISSION REQUIREMENTS

A. Make submittals promptly in such sequence as to cause no delay in the work or in the work of any other Contractor.

B. All submittals shall be sufficiently in advance of construction requirements to provide no less than 14 calendar days for review from the time the Owner's Representative receives them. No less than 21 calendar days will be required for major equipment that requires review by more than one engineering discipline.

C. Number of submittals required:

1. Shop drawings as defined in Paragraph 1.3 A: Six (6) copies.

2. Product data as defined in Paragraph 1.3 B: Six (6) copies.

3. Samples: Submit the number stated in the respective specification sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The project title and number.

3. Contractor identification.

4. The names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. A blank space suitably sized for Contractor and Engineer stamps.

E. The Engineer will retain two copies of submittals requiring revision.

F. The Engineer will also retain two copies of the final submittal.

1.6 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The Engineer's review is for general conformance with the design concept and Contract Documents. Checking is only for conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the Contract Documents or from departures therefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. The review of shop drawings, data and samples will be general. They shall not be construed as permitting any departure from the Contract requirements; as relieving the Contractor of responsibility for any errors in his work, including details, dimensions and materials; as approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer and/or Ownerôs Representative finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Ownerôs Representative may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes:

Code 1 - "NO EXCEPTIONS TAKEN" is assigned when there are no notations or comments on the submittal. When returned under this code, the Contractor may release the equipment and/or material for manufacture.

Code 2 - "MAKE CORRECTIONS NOTED" is assigned when a confirmation of the notations and comments is required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This

confirmation is to address the omissions and nonconforming items that were noted.

Code 3 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 4 - "REVISE AND RESUBMIT" is assigned when the submittal is in noncompliance with the Contract Documents and must be corrected and the entire package resubmitted. Submittal of additional data is to be received by the Engineer within 15 calendar days of the date of Engineer's transmittal requiring the submittal of this data.

Code 5 - "SUBMIT SPECIFIED ITEM" is assigned where the submittal requires additional data to meet the intent of the Contract Documents. The Contractor must submit the additional data to bring the submittal into conformance.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles, or other similar methods, to revisions other than the corrections requested by the Engineer and/or Owner's Representative, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer and/or Owner's Representative.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may, at his option, provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Owner's Representative at least seven working days prior to release for manufacture.

H. When the shop drawings have been completed to the satisfaction of the Engineer and Owner's Representative, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer and/or Owner's Representative.

1.7 DISTRIBUTION

A. Distribute reproduction of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Owner's Representative. Number of copies shall be as directed by the Owner's Representative, but shall not exceed 6.

1.8 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A. If specifically required in other sections of these specifications, the Contractor shall submit a P.E. Certification for each item required, in the form attached to this section, completely filled in and stamped by a Hawaii Registered Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END SECTION

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the State of Hawaii and that he/she has been employed by (Name of Contractor) to design _____ in accordance with Specification Section_____ for the (Name of Project) _____. The undersigned further certifies that he/she has performed the design of the _____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the (Insert Name of Owner) _____ or Owner's representative with seven (7) days following written request therefor by the Owner.

_____
P.E. Name

_____
Signature

_____
Address

_____
Contractor's Name

_____
Signature

_____
Title

_____
Address

END SECTION

SECTION 01311 - CONSTRUCTION SCHEDULING

PART 1 - GENERAL

1.1 PROGRAM DESCRIPTION

A. A Critical Path Method (CPM) construction schedule shall be used to control the work and to provide a basis for determining job progress. The construction schedule shall be prepared and updated by the Contractor. All work shall be done in accordance with the established CPM schedule and the Contractor and his subcontractors shall be responsible for cooperating fully with the Owner's Representative and the Owner in effectively utilizing the CPM schedule.

B. The Contractor shall develop his own outline of the work and prepare his proposed CPM schedule. The computer-based schedule shall be the product of a recognized commercial computer software producer.

C. In addition to the CPM schedule, the Contractor shall submit a schedule of submittals and a schedule of values.

D. Preliminary schedules shall be submitted for review within 10 calendar days after the effective date of the Construction Agreement.

1.2 INITIAL CONFERENCE

A. Within 15 calendar days following the receipt of the Notice to Proceed, the Contractor shall meet with the Owner's Representative to discuss and agree upon the proposed standards for the CPM schedule.

B. Approval of the CPM activity network by the Owner's Representative is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work within the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Owner's Representative in no way makes the Owner's Representative an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Owner's Representative, of the CPM schedule.

1.3 PROGRESS REPORTING

A. Progress under the approved CPM schedule shall be evaluated monthly by the Contractor and the Owner's Representative. Not less than seven days prior to each monthly progress meeting, they shall meet at the jobsite and jointly evaluate the status of each activity on which work has started or is due to start, based on the preceding CPM schedule; to show actual progress, to identify those activities started and those completed during the previous period, to show the estimated time required to complete or the percent complete of each activity started, but not yet completed, and to reflect any changes indicated for the network. Activities shall not be considered to be complete until they are, in fact, 100 percent complete.

1.4 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

A. Whenever it becomes apparent from the current CPM schedule and CPM Status Report that delays to the critical path have resulted and the contract completion date will not be met, or when so directed by the Owner's Representative, the Contractor shall take any or all of the following actions at no additional cost to the Owner. He shall submit to the Owner's Representative for approval, a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the approved schedule.

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.

2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.

B. If, when so requested by the Owner's Representative, the Contractor fails to submit a written statement of the steps he intends to take or fails to take such steps, the Owner's Representative may direct the Contractor to increase the level of effort in manpower (trades), equipment, and work schedule (overtime, weekend and holiday work, etc.) to be employed by the Contractor in order to remove or arrest the delay to the critical path in the approved schedule, and the Contractor shall promptly provide such higher level of effort at no additional cost to the Owner.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END SECTION

01560 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REQUIREMENTS

A. Comply with the following requirements for environmental protection in performing all construction activities.

B. Comply with all governing laws, regulations and ordinances.

C. Reference is made to the NPDES Permit and Stormwater Runoff Control Practices and Maintenance Plan.

1.3 RUBBISH

A. No burning of debris and waste materials shall be permitted on the project site.

B. No burying of debris and waste materials, except for materials which are specifically indicated elsewhere in these specifications or plans as suitable for backfill, shall be permitted on project site.

C. All unusable debris and waste materials shall be hauled away to appropriate offsite dump areas. During loading operations, debris and waste materials shall be watered down to allay dust.

D. No dry sweeping shall be permitted in cleaning rubbish and fines, which can become airborne, from paved areas. Vacuuming, wet mopping or wet or damp sweeping is required.

E. Clean up shall include collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable materials, and removal as required. Frequency of clean up shall coincide with rubbish producing events.

1.4 DUST

A. Dust shall be kept within acceptable levels at all times including non-working hours, weekends and holidays, in compliance with State Department of Health, Public Health Regulations.

B. Method of dust control and all costs incurred therefore shall be the responsibility of the Contractor. Use of chemicals for dust control is not permitted.

C. Contractor shall responsible for all damage claims.

D. Provide protective covering over existing and complete work.

1.5 NOISE

A. Noise shall be kept within acceptable levels at all times in compliance with State Department of Health, Public Health Regulations.

B. Contractor shall obtain and pay for community noise permit from State Department of Health when construction equipment or other devices emit noise at levels exceeding allowable limits.

1.6 EROSION

A. During interim grading operations, grade shall be maintained so as to preclude any damages to adjoining property from water and eroding soil. Temporary berms, cut-off ditches, and other provisions which may be required because of Contractor's method of operation shall be installed at no cost to the Owner.

1.7 EQUIPMENT MAINTENANCE

Any fuel, oil, grease, battery electrolyte or engine coolant chemicals spilled, dropped or otherwise released onto the ground surface shall be picked up and removed to a legal disposal site at the Contractor's expense. No such material shall be permitted to enter any natural or artificial drainage channel.

END SECTION

SECTION 01600 - DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.2 TRANSPORTATION AND DELIVERY

A. All parts and equipment shall be properly crated, packaged, sealed and/or otherwise protected so that no damage or deterioration will occur during shipping, delivery, handling, or while stored. Transport and handle items in accordance with manufacturer's instructions.

B. Heavy items shall be packed for fork lift truck handling and/or with hook or sling for crane handling. All items subject to water damage shall be packed or provided with waterproof covers suitable for outdoor storage. All packing shall be strong, durable, and rugged and shall be designed to prevent uneven forces on the items. Fragile items shall be suitably protected with special padding and shall be so marked.

C. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Owner.

D. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

E. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

F. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

G. Provide necessary equipment and personnel to unload all items delivered to the site.

H. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e., Owner, other Contractors), perform inspection in the presence of the Owner or his representative. Notify Owner verbally, and in writing, of any problems.

I. Items shall not be shipped until factory testing (where required) and submittals comply with specification requirements.

1.3 STORAGE AND PROTECTION

A. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Owner. Instruction shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter. Provide temporary covers for such material.

C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.

D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Owner. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.

1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.

2. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding." Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

3. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.

4. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given,

the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.4 SAFETY PRECAUTIONS

A. The Contractor shall observe all appropriate safety procedures and reasonable precautions when handling, storing, and utilizing chemicals at the site.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END SECTION

SECTION 01700 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies administrative and procedural requirements for project closeout including, but not limited to, closeout procedures, final cleaning, adjusting, project record documents, spare parts and maintenance materials.

1.2 RELATED WORK

A. Quality control testing, including full facility operational tests by Contractor and by Owner, is included in Section 01720.

B. Warranties and bonds are included in Section 01740.

1.3 RECORD DOCUMENTS

A. Maintain on site, one set (unless otherwise noted) of the following documents. Actual revisions to the work shall be recorded in these documents:

1. Contract Drawings (two sets).
2. Specifications.
3. Addenda.
4. Change orders and other modifications to the Contract.
5. Reviewed shop drawings, product data and samples.

B. Store record documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each PRODUCT section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and Modifications.

E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
3. Field changes of dimension and detail.
4. Details not on original Contract Drawings.

F. Submit documents to Owner's Representative with final application for payment.

1.4 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Owner's Representative's inspection.

B. Provide submittals to Owner's Representative that are required by governing or other authorities.

C. Submit final application for payment identifying total adjusted contract sum, previous payments and sum remaining due.

1.5 FINAL CLEANING

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Remove labels that are not permanent labels.

2. Wipe surface of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

3. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth, even-textured surface.

4. Clean adjacent structures and improvements of all dust, dirt and debris caused by removal operations, as acceptable to the Owner's Representative. Return native areas to condition existing prior to the start of the work.

1.6 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END SECTION

SECTION 01720 - QUALITY CONTROL

PART 1 – GENERAL

1.1 TESTING REQUIREMENTS

A. All equipment, materials, equipment installation, pipes, and workmanship included in this Contract, and/or specified herein, shall be tested by the Contractor, as specified before any facility or part thereof, is put into operation. For the purpose of this section, "equipment" shall mean mechanical equipment, electrical device or system, or instrumentation device or system, or material. Inspections and tests shall be as specified herein, and as specified in the individual sections, and shall be made to determine whether the equipment is in good order and condition, has been properly manufactured, assembled, installed, aligned, adjusted, calibrated, and connected. Any changes, adjustments, replacement, or modifications required to make the equipment operate and/or make the equipment installation as specified shall be carried out by the Contractor as part of the work under this contract, at no additional cost to the Owner.

B. No tests specified herein shall be implemented until the item(s) to be tested has been inspected and permission given by the Owner's Representative for the test. The Contractor remains responsible to inspect the item(s) before testing to satisfy himself that the item(s) can be started without damage to the item(s) or other items or any personnel. Unless specified otherwise, all costs of testing shall include, but are not limited to, temporary facilities, connections, labor, materials, and testing equipment. All costs of testing shall be borne by the Contractor. Water for the operational testing and initial operation shall be furnished by the Contractor as specified. Inspections and tests, unless otherwise specified or accepted, shall be adequate to demonstrate compliance with specified performance requirements. Testing equipment shall be furnished by the Contractor and shall be appropriate for the use intended. The testing equipment shall be calibrated and/or certified by an approved agency, as often as necessary to insure its proper operation in accordance with the specifications.

C. Where, in case of an otherwise satisfactory test, any doubt, dispute, or difference should arise between the Owner and the Contractor regarding the test results, the methods, or equipment used in the carrying out such tests, the Owner may order the test to be repeated. Repeated tests as may be necessary to achieve the specified requirements shall be made by the Contractor at no additional cost to the Owner.

D. The Contractor, in addition to the quality control testing specified under this section of the specifications, shall perform all material mill tests and equipment performance tests (factory and field) and provide the Owner with written test reports (as required in the specifications) to demonstrate compliance with the technical specifications (Divisions 2 through 16).

E. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial

testing laboratory acceptable to the Owner. The laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards.

F. Contractor shall obtain written acceptance of the independent (third party) testing laboratory to be used from the Owner, prior to having services performed.

1.2 RELATED WORK

A. Contract closeout is included in Section 01700.

1.3 TESTING AND INSPECTION SERVICES TO BE FURNISHED BY CONTRACTOR

A. The Contractor shall be responsible, as a minimum, for the following testing on the project:

1. Proposed materials for concrete mixes shall be in accordance with Section 03300.

2. Bacteriological sampling and testing of disinfection for potable water pipelines and storage structures.

3. Aggregate road mixes and asphalt mixtures composition and gradation tests.

4. Bedding, embankment and backfill gradation and compaction testing.

5. Concrete testing services in accordance with Section 03300.

B. The testing laboratory shall perform all laboratory tests in the shortest time consistent with the specified standards and furnish a written report of each test directly to the Owner without delay.

C. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting construction work when necessary. Contractor shall furnish personnel, equipment and facilities to perform sampling and field-testing activities, and to deliver samples and test specimens to the testing laboratory. When sampling or testing activities are performed in the field by testing laboratory personnel, Contractor shall furnish all assistance necessary for proper results.

D. Contractor shall not retain the services of a testing laboratory that is unacceptable to the Owner. The Contractor shall submit the names and qualifications of the testing laboratories he proposes to use on the project for approval by the Owner. If at any time during the construction of the work, the services of a testing laboratory becomes unacceptable, in the opinion of the Owner, the Contractor shall terminate the services of the unacceptable testing laboratory and replace it with a new testing laboratory acceptable to the Owner.

E. Contactor shall retain the services of an independent licensed special inspector to certify that installation of the reinforcing bars is in conformance with the plans.

1.4 TRANSMITTAL OF TEST INFORMATION AND REPORTS

A. Written reports of test results and engineering data required to establish the acceptability of equipment and materials proposed for use in the work shall be

submitted in accordance with the requirements of Section 01300 and the respective specification sections.

B. A written report of each test performed by a testing laboratory in the laboratory or field shall be submitted to the Owner within three (3) calendar days of the completion of the test. Two (2) copies of each test report shall be submitted to the Owner. Individual test reports shall be consecutively numbered. Retest results shall reference the original failed test number.

1.5 FACTORY TESTS

A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services will be performed by an inspection organization acceptable to the Owner.

B. If an independent testing laboratory or inspection organization performs inspections and/or witnesses tests at the place of manufacture or fabrication, a written report on the inspection and/or three (3) copies of the inspection and/or test results shall be submitted to the Owner within seven (7) calendar days of the completion of the inspection or witness of tests.

1.6 FIELD TESTS AND STARTUP

A. Field tests shall be conducted prior to the Initial Operational Test.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END SECTION

SECTION 02070 – TRIAXIAL GEOGRID

PART 1- GENERAL

1.1 SCOPE

A. This section describes furnishing and placing triaxial geogrid on a prepared surface.

PART 2 – PRODUCTS

2.1 REINFORCEMENT

(A) General. Unless otherwise indicated in the contract documents, geogrid shall be manufactured from a punched and drawn polypropylene material that has been formed by regular network of integrally connected, multi-directional tensile elements of appropriate size and shape to allow interlocking with the unbound aggregate or base course materials. The combination of the two materials creates an improved mechanically stabilized layer (MSL) with significantly improved properties and performance capabilities that quantifiably allows a designer to modify aggregate and/or asphalt pavement sections.

(B) Geogrid Acceptance. The manufacturerøs certificate of compliance and certified test results from a nationally accredited USA testing laboratory on the products, tested within six months of the submittal date shall be submitted for approval. Additionally, the following shall be included in the submittal:

(1) Manufacturerøs name, current address, and telephone number.

(2) Manufacturerøs current Quality Assurance / Quality Control Manual.

(3) Full product name by trademark and product number.

(4) Geogrid polymer type(s).

(5) Recommended overlap.

(6) Six square yards of geogrid sample. Geogrid sample shall conform to requirements of Subsection 311.02(C) ï Sampling.

(C) Sampling. Sampling shall be in accordance with ASTM D4354.

(D) Physical Properties. Physical property values in these specifications represent minimum average roll values (MARV) and are included for Quality Assurance purposes only. Average test results for any individual roll tested within a lot sampled, shall meet or exceed specified values.

(E) Packaging. Geogrids shall be provided in roll form of length and

width to meet requirements.

(F) Identification. Unless otherwise indicated in the contract documents, geogrid shall be identified in accordance with ASTM D4873 and this subsection. Include the following information:

(1) Unique roll number serially designated.

(2) Manufacturerôs lot number or control numbers.

(3) Name and geogrid manufacturer.

(4) Date of manufacture.

(5) Product brand name.

(6) Manufacturerôs style or catalog designation of the geogrid.

(7) Roll width, in feet.

(8) Roll length, in feet.

(9) Net weight of geogrid.

(G) Storage and Handling. Geogrids shall be stored and handled in accordance with ASTM D4873 and this subsection. During shipment and storage, material shall not be exposed to sunlight or other forms of light that contain ultraviolet rays, for more than 6 months.

(H) Geogrids for Flexible Pavement Asphalt and Aggregate Base Section Modification Applications. Material shall conform to Subsection 311.02 ï Materials.

(I) Geogrid material shall meet Table 311.02 ï 1 ï Material Requirements.

TABLE 2.1 – MATERIAL REQUIREMENTS[1]				
Physical Property	Test Procedure	Longitudinal	Diagonal	General
Rib pitch, mm (in.)	Callipered	40+/-3 (1.6+/-0.1)	40+/-3 (1.6+/-0.1)	
Aperture shape	Observation			Triangular
Radial stiffness ratio[2]	ASTM D6637			Ó0.60
Radial stiffness @ 0.5% strain lbs./ft (kN/m), Min.[3]	ASTM D6637			15,430 (225)
Junction Efficiency [4]	ASTM D7737			93

[1] All material properties listed are the minimum levels that shall be met to pass Quality Assurance verification.

[2] Ratio of the minimum value to the maximum value of radial stiffness at 0.5% strain.

[3] Radial stiffness is measured on both the rib directions and the ñmid-ribòdirections, i.e. directions that bisect the angles between ribs.

[4] Load transfer capability determined in accordance with ASTM D7737 and ASTM 6637 and expressed as a percentage.

[5] Resistance to chemical degradation ï it shall be resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments in accordance with EPA 9090 immersion testing. Resistance to ultra-violet light and weathering ï it shall be resistant to loss of load capacity or structural integrity when subjected to 500 hours of ultra-violet light and aggressive weathering in accordance with ASTM D4355.

(J) Performance Requirements for Geogrid material not conforming to Table 311.02 ï 1 ï Materials Requirements.

(1) For section modification through aggregate base and asphalt concrete reduction, the stiffness enhancement of the geogrid shall be calibrated and validated with results of Accelerated Pavement Testing (APT at a facility in the United States, in compliance with NCHRP Report 512 and Synthesis 325 and AASHTO R-50. Testing shall utilize the specific branded product proposed for use. Test results are only valid if total ESALs trafficked on each section tested falls within range of ESALs predicted in the design of those sections. Testing must be performed on paved structures comparing geogrid sections to thicker asphalt concrete control

sections, with a minimum trafficking requirement of 75,000 ESALs at less than ½ rut depth.

(2) No proposed alternative equal geogrid will be accepted based on material index properties or explanations of performance based on testing of geogrid index properties. Geotextile materials shall not be considered as an alternate to geogrid materials for subgrade improvement or base/subbase reinforcement applications.

(3) Any submittal for an alternate MSL must be submitted at least two weeks in advance of the bid date. Submittals submitted less than two weeks before the bid date will be considered non-responsive and be considered invalid. The alternate MSL submittal shall contain the following:

(a) A written statement from the alternative pavement design engineer of record that the proper calibration and validation testing has performed for the geogrid reinforcement utilized in the MSL in accordance with these specifications.

(b) A submittal package that includes performance studies referenced in section 311.02 (J) (1) above and documented evidence of calibration and validation testing.

(c) Any other information as requested by the Engineer.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. Refer to manufacturerôs instructions.

END SECTION

DIVISION 2 – SITE WORK

SECTION 02100 – SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and

Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SCOPE

A. Cleaning site of debris, grass, trees and other plant life in preparation for site or excavation work.

B. Protection of existing structures, trees or vegetation indicated on the contract documents to remain.

1.3 RELATED WORK

A. Section 02200 ï Earthwork

B. Construction Drawings

1.4 JOB CONDITIONS

A. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practical.

B. Variations to conditions or discrepancy in actual conditions as they apply to site preparation operations are to be brought to the attention of the Owner prior to the commencement of any site work.

PART 2 - PRODUCTS

A. Not Applicable.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.

3.2 PROTECTION

A. Locate and identify existing utilities that are to remain and protect them from damage.

B. Protect trees, plant growth and features designed to remain as final landscape.

C. Conduct operations with minimum interference to public or private accesses and facilities. Maintain access and egress at all times and clean or sweep any roadways daily or as required by the governing authority. At such times as deemed necessary by the Owner, dust control shall be provided with sprinkling systems or equipment provided by the Contractor.

D. Protect bench marks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same.

E. Provide traffic control as required, in accordance with the U.S. Department of transportation ñManual of Uniform Traffic Control Devicesò and the State Highway Department and/or County of Maui, Department of Public Works requirements.

3.3 CLEARING

A. The project site should be cleared of all vegetation, concrete footings and slabs-on-grade, debris, and other deleterious material. Prior to placement of fill, the exposed subgrade should be scarified to a minimum depth of 8 inches, moisture conditioned to about 2 percent above optimum moisture content, and compacted to a minimum 90 percent compaction as determined by ASTM D 1557. Refer to geotechnical report conducted by PSC Consultants, LLC.

B. Clear areas required for access to site and execution of work.

C. Remove grass, trees, plant life, stumps and all other construction debris from the site to a dump site that is suitable for handling such material according to state laws and regulations.

D. Soft or yielding areas encountered during site preparation should be over-excavated to expose firm soil surface and stabilized by backfilling with select material placed in 8-inch thick, loose lifts and compacted to a minimum of 90 percent relative compaction. Scarification and recompaction operations are to be performed in the presence of the Contractorôs hired Geotechnical Engineer.

END SECTION

SECTION 02200 – EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SCOPE

A. All excavation shall be unclassified.

B. Excavation and embankment for driveway construction.

C. Scarifying, compaction, moisture conditioning, drying, and removal of unsuitable material to ensure proper preparation of areas for fills or proposed improvements.

D. Cutting, filling and grading to required lines, dimensions, contours and proposed elevations for proposed improvements.

E. Construction of swales where indicated.

1.3 RELATED WORK

A. Section 02100 ï Site Preparation

B. Section 02223 ï Excavation, Backfilling and Compacting for Pavement

C. Section 02227 ï Aggregate Materials

D. Construction Drawings

E. Hawaii Standard Specifications for Road, Bridge, and Public Works Construction, State of Hawaii, Department of Transportation, Highways Division, 2005 and as amended (Paragraphs on Measurement and Payment do not apply to this project).

F. Geotechnical Exploration Report For Kahikinui Driveway Improvements, Kahikinui, Maui, Hawaii. PSC Consultants, LLC, November 15, 2019.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM) latest edition.

1.	D 422	Method for Particle Size Analysis of Soils
2.	D 1556	Test for Density of soil in Place by the Sand Cone Method
3.	D 1557	Test for Moisture-Density Relations of Soil Using 10-lb. (4.5 Kg) Rammer and 18-inch (457 mm) Drop (Modified Proctor)
4.	D 1883	California Bearing Ratio (CBR) of Laboratory-Compacted Soils
5.	D 2216	Laboratory Determination of Moisture content of Soil
6.	D 2167	Classification of Soils for Engineering Purposes

7. D 2922 Test for Density of Soil and Soil ï Aggregate in Place by Nuclear Methods (Shallow Depth)

8. D 4318 Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils

1.5 QUALITY ASSURANCE

A. Independent Testing Laboratory selected and paid by the Contractor, shall be retained to perform construction testing on site based on the following:

1. Subgrade Areas: Compaction tests for each lift will be performed as follows:

a. Subgrade ï 1 test per lift per 1,000 square feet

b. Fill ï Below 2.5 feet, 1 test per 2,000 cubic yards
Above 2.5 feet, 1 test per lift per 500 lineal feet per lane

B. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

C. In all areas to receive pavement, a CBR test shall be performed for each type of material imported for off-site for use as subgrade material.

D. The following tests shall be performed by the Independent Testing Laboratory on each type of on-site or imported soil material used as compacted fill as part of construction testing requirements.

1. Moisture and Density Relationship: ASTM D 1557

2. Mechanical Analysis: ASTM D 422

3. Plasticity Index: ASTM D 4318

4. California Bearing Ratio (CBR) of Laboratory-Compacted Soils ASTM D 1883

E. Field density tests for in-place materials shall be performed by the Independent Testing Laboratory according to one of the following standards as part of construction testing requirements.

1. Sand-Cone Method: ASTM D 1556

2. Balloon Method: ASTM D 2167

3. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission)

F. Independent Testing Laboratory shall prepare test reports that indicate test locations, elevation data, and test results. Ownerôs Representative and Engineer shall be provided with copies of reports within 96 hours of time test was performed. In event that any test performed fails to meet these Specifications, Ownerôs Representative and Engineer shall be notified promptly by independent testing laboratory.

G. All costs related to retesting due to failures shall be paid for by the contractor at no additional expense to Owner. Contractor shall provide free access to site for testing activities.

1.6 GEOTECHNICAL REPORT

A. A geotechnical investigation was conducted by PSC Consultants, LLC., the results of which are presented in PSC's report entitled, Geotechnical Exploration Report For Kahikinui Driveway Improvements, Kahikinui, Maui, Hawaii dated November 15, 2019. This report is part of the Contract Documents as an exhibit.

1.7 SUBMITTALS

A. Submit a sample of each type of off-site fill material that is to be used at the site in an airtight, 10 lb container for the testing laboratory.

B. Submit gradation and material test results for granular materials.

C. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the Owner or Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The excavated on-site soils should be suitable for use as general fill materials, provided that they are free of vegetation, deleterious materials, and rock fragments greater than 3 inches in largest dimension. It should be noted that the project site is located in a high rainfall environment throughout the year therefore, the in-situ soils will constantly be in a very moist to wet condition and drying or aerating the excavated materials may be necessary prior to their use as general fill. The cost to mix, blend and/or screen fill material shall be considered as incidental work to the contract. The Engineer and Owner will not make additional or separate payment.

B. Imported fill materials should consist of select granular fill material, such as crushed basalt or coral. The select granular fill should be well-graded from coarse to fine with particles no larger than 3 inches in largest dimension and should contain between 10 and 30 percent particles passing the No. 200 sieve. The material should have a laboratory CBR value of 20 or more and should have a maximum swell of less than 1 percent when tested in accordance with ASTM D1883.

C. Satisfactory materials shall be free of rubbish, wood scraps, vegetative matter, soft unsound particles, construction debris, hazardous materials in concentrations greater than permitted by Federal and State regulations, and excessive moisture.

D. Aggregate fill as specified in Section 02227.

E. Sand shall be masonry quality commercially available sand with gradation finer than No. 4 sieve.

F. Mirafi N-Series. Nonwoven Geotextiles shall be needlepunched, nonwoven geotextiles comprised of polypropylene fibers, Mirafi 180N or approved equal.

PART 3 - EXECUTION

3.1 USE OF STANDARDS

A. Identify required lines, levels, contours, and datum.

B. Locate and identify existing utilities that are to remain and protect them from damage.

C. Protect plant life, fences, existing utilities structures and paving from excavating equipment and vehicular access.

D. Protect benchmarks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed is shall be referenced by the licensed land surveyor and replaced, as necessary, by the same.

E. Remove from site material encountered in grading operations that, in opinion of the Geotechnical Engineer or the Owner's Representative is unsuitable or undesirable for backfilling, subgrade or foundation purposes. Dispose of in legal manner. Backfill areas with layers of suitable material and compact as specified.

F. Should historic remains such as artifacts, burials, concentrations of shell or charcoal be encountered during construction activities, work shall cease immediately in the immediate vicinity of the find. The Contractor shall immediately contact the Owner's Representative, who shall notify the Planning Department and State Historic Preservation Division at (808) 742-7033, which will assess the significance of the find and recommend the appropriate mitigation measures, if necessary.

G. In areas where in-situ basalt rock formation is exposed at the surface, after proof-rolling to attempt to disclose any shallow voids or cavities, the exposed subgrade should be covered with a minimum of one (1) layer of a non-woven filter fabric, such as Mirafi 180N, prior to the placement of fill to minimize the potential of infiltration of soil particles into the underlying crevices or small voids.

3.2 EXCAVATION FOR FILLING AND GRADING

A. Classification of Excavation: Contractor acknowledges that he has investigated the site to determine type, quantity, quality, and character of excavation work to be performed. Excavation shall be considered as unclassified excavation.

B. Excavate to the required elevations including allowances for base course and imported borrow. Unsuitable material shall become the property of the Contractor and shall be removed from the site. Excavate sufficient working space to permit installation and removal of forms. Cut slopes shall be planted with grass and temporarily irrigated, as soon as practical to minimize the effect of erosion and weathering.

C. Excavated on-site material containing rock or stone greater than 3" in largest dimension is unacceptable as fill to within the proposed paving and trenching area.

D. Perform excavation using capable, well maintained equipment and methods acceptable to Owner and governing agencies.

E. When performing grading operations during periods of wet weather, provide adequate drainage and ground water management to control moisture of soils.

F. Shore, brace, and drain excavations as necessary to maintain safe, secure, and free of water at all times.

3.3 FILLING AND SUBGRADE PREPARATION

A. Fill areas to contours and elevations shown with on-site excavated material or suitable borrow.

B. All areas to receive fill should be scarified to a depth of about 8 inches, moisture-conditioned to at least 2 percent above the optimum moisture content and compacted to a minimum of 90 percent relative compaction. Relative compaction refers to the in-place, dry density of soil expressed as percentage of the maximum dry density of the same soil established in accordance with ASTM Test designation D 1557. The optimum moisture content is the moisture content corresponding to the maximum compacted dry density.

C. Engineered fill: The excavated on-site soils should be suitable for use as general fill materials, provided that they are free of vegetation, deleterious materials, and rock fragments greater than 3 inches in largest dimension. It should be noted that the project site is located in a high rainfall environment throughout the year therefore, the in-situ soils will constantly be in a very moist to wet condition and drying or aerating the excavated materials may be necessary prior to their use as general fill. Additionally, all imported fill materials should consist of select granular fill material, such as crushed basalt or coral. The select granular fill should be well-graded from coarse to fine with particles no larger than 3 inches in largest dimension and should contain between 10 and 30 percent particles passing the No. 200 sieve. The material should have a laboratory CBR value of 20 or more and should have a maximum swell of less than 1 percent when tested in accordance with ASTM D1883.

D. Place fill in level lifts of 8 inches loose thickness, moisture-conditioned to at least 2 percent above the optimum moisture content and compacted to at least 90 percent relative compaction. Select granular fill materials should be placed in level lifts of about 8 inches in loose thickness, moisture-conditioned to above the optimum moisture, and competed to at least 90 percent relative compaction.

E. Soft or yielding areas encountered during site preparation should be over-excavated to expose firm soil surface and stabilized by backfilling with select material placed in 8-inch, loose lifts and compacted to a minimum of 90 percent relative compaction. It is important that the scarification and recompaction operations to be performed in the presence of the Contractorôs hired Geotechnical Engineer.

F. If the subgrade soils are pumping during subgrade preparation, then subgrade may be stabilized by cement treatment to reduce the potential for pumping subgrade conditions. As a guide, one sack of cement may be used for approximately 25 square feet of subgrade area. Alternatively, the subgrade may be proof-rolled and a woven geotextile fabric, such as Mirafi 500X or equivalent, should be placed on the subgrade prior to placement of subsequent lifts of fill.

G. Areas with unsuitable alluvial subgrade shall be undercut 2 feet in fill areas and are to be recompacted to 90 percent of maximum density at optimum moisture content. The soils engineer will indicate the exact areas to receive this treatment. The Contractor shall state, in his proposal, a cost per cubic yard to excavate, moisture condition, and recompact the material so designated in the field.

H. Benching shall be of sufficient width to permit construction equipment to operate. Begin each horizontal cut at the intersection of original ground and the vertical sides of the previous cuts. Recompact the material cut along with the new embankment material.

I. When embankments across swampy or excessively moist ground cannot support the weight of trucks or other hauling equipment, the lower part of the fill may be constructed by dumping successive loads of gravel, cobbles, and boulders in a uniformly distributed layer of a thickness not greater than necessary, or use permeable separator with granular material of adequate thickness to support vehicle placing the layers. Construct remainder of embankment according to the contract documents.

3.4 MAINTENANCE OF SUBGRADE

A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.

B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, and dump trucks.

C. Remove areas for finished subgrade found to have insufficient compaction density to depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.5 FINISH GRADING

A. Grade all areas where finish grade elevations or contours are indicated on Drawings, other than paved areas, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade elevation, and all ground surfaces, shall not be more than 0.20 feet above or below established finished subgrade elevation for road and sidewalk subgrade, and 0.10 feet above or below established finished subgrade elevation for lot grading; all ground surfaces shall transition uniformly between indicated elevations.

B. Correct all settlement and eroded areas due to any defects in material or workmanship within one year after date of completion at no additional expense to Owner. Bring grades to proper elevation. Replant or replace any grass, shrubs, or bushes, or other vegetation that appears dead, dying, or disturbed by the Contractor's construction activities and/or due to materials or workmanship that are defective, inferior, or not in accordance with the drawings and specification. Adjust or replace geotextile and matting material disturbed by the Contractor's construction activities.

END SECTION

SECTION SECTION 02220 - SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Demolition and removal of concrete driveway at various locations as shown on Plans.

2. Filling voids created as a result of removals or demolition.

B. Related Sections

1. Section 02100 - Site Preparation

2. Section 02200 - Earthwork

3. Section 02227 - Aggregate Materials

4. Construction Drawings

C. References

1. State of Hawaii Standard Specifications for Road, Bridge and Public Works Construction, Latest Edition, with all current amendments, governs all work within the State of Hawaii Right-of-Way and other parts of the project unless otherwise noted.

2. The Standard Details for Public Works Construction, County of Maui, 1984 with all current amendments governs work outside the State of Hawaii Right-of-Way.

D. Definitions

1. Project Representative: The person designated, in writing, by the Owner to act as its representative at the construction site and to perform construction inspection services and administrative functions relating to this contract. Initial contact by the Contractor with the Owner shall be through the Project Representative.

1.2 REGULATORY REQUIREMENTS

A. Conform to applicable State and City codes for demolition of structures, safety of adjacent structures, dust control, and runoff control.

B. Obtain required permits and licenses from appropriate authorities. Pay associated fees including disposal charges.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct public or private roadways, sidewalks, or fire hydrants without appropriate permits or written authorization.

1.3 QUALITY ASSURANCE

A. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

B. Work to be done within the public right-of-way shall be in accordance with the requirements of the County or State Standard Specifications, whichever is applicable.

Contractor to provide at least one (1) person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this section.

C. Any removal work to be done adjacent to neighboring properties shall be coordinated with the Owner and adjacent property land owner prior to actual removal.

1.4 SUBMITTALS

A. Schedule: Within ten (10) work days after award of contract, Contractor shall submit to the Project Representative a schedule, detailing sequence and time of completion of phases of work under this section.

B. Project Record Documents: Accurately record actual locations of capped utilities and subsurface obstructions that will remain after demolition. Prepare, certify, and submit record as part of closeout submittals.

1.5 PROJECT CONDITIONS

A. Owner assumes no responsibility for condition of structures to be demolished.

B. Conditions existing at time of inspection for bidding purposes will be maintained by Owner, as reasonably practical.

C. Use of explosives will not be permitted for demolition activities.

D. The Contractor shall verify all lines, levels and elevations indicted on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Project Representative and any change shall be made in accordance with his instruction. The Contractor shall not be entitled to extra payment if he fails to report the discrepancies before proceeding with any work whether within the area affected or not.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Fill material shall be per plan and Soils Report.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect existing landscaping materials, appurtenances, and structures, which are not to be demolished. Repair damage to existing items to remain caused by demolition operations at no cost to Owner.

B. Notify adjacent property owners of work that may affect their property, potential noise, utility outages, or other disruptions. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property. Coordinate notice with Owner.

3.2 GENERAL DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent structures or pavements to remain.

B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed by authority.

C. Secure the site and prevent-public access.

D. Sprinkle with water to minimize dust. Provide hoses and water connections for this purpose.

E. Comply with governing regulations pertaining to environmental protection.

F. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Sweep pavements as often as necessary to control the spread of debris. Return adjacent areas to condition existing prior to start of work.

3.3 DEMOLITION

A. Demolish existing site improvements at locations as shown on the drawings.

B. When utility lines are encountered that are not indicated on the drawings, the Project Representative shall be notified prior to further work in that area. If utility lines are encountered that are not shown on drawings, contact the Project Representative for further instructions.

C. Remove existing concrete paving, driveways, including aggregate base as indicated.

D. Upon completion of the work, the Contractor shall promptly remove all tools, materials, apparatus, lights, barriers, etc., from the site.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. All demolition materials and debris shall become property of the Contractor and shall be promptly removed from the premises. Leave areas of work in clean condition.

B. No burning of any material, debris, or trash on-site or off-site will be allowed.

C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to appropriately permitted landfills, salvage yards, or other appropriate facilities. Local regulations regarding hauling and disposal shall apply.

END SECTION

SECTION 02223 – EXCAVATION, BACKFILLING, AND COMPACTING FOR PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

B. Geotechnical Exploration Report For Kahikinui Driveway Improvements Project Phase 1, Kahikinui, Maui, Hawaii dated November 15, 2019.

1.2 SECTION INCLUDES

A. Excavate to line, grade and configuration as shown in the plans and specifications for proposed and future pavement areas.

B. Fill to line, grade and configuration as shown in the plans and specifications for proposed and future pavement areas.

C. Compacting fill materials in an acceptable manner as stated herein.

1.3 RELATED WORK

A. Section 02200 ï Earthwork

B. Section 02227 ï Aggregate Materials

C. Section 02505 ï Paving Base Course

D. Section 03100 ï Concrete Formwork

E. Section 03300 ï Cast-In-Place Concrete

F. Construction Drawings

G. Hawaii Standard Specifications for Road and Bridge Construction, State of Hawaii, Department of Transportation, Highways Divisions, 2005 and as amended (Paragraphs on Measurement and Payment do not apply to this project)

1.4 QUALITY ASSURANCE

A. All work must conform to Section 203 of the Standard Specifications.

1.5 SUBMITTALS

A. Shop drawings or details pertaining to excavating and filling for pavement are not required unless otherwise shown on the drawings or specified elsewhere, or if contrary procedures to the project documents are proposed.

B. Submit a sample of each type of off-site fill material that is to be used in backfilling in an air-tight, 10 lb. container for the testing laboratory or submit a gradation and certification of the aggregate material that is to be used to the testing laboratory for review.

C. Submit compaction test results.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill material from on-site as specified in Section 02200 and Geotechnical Exploration Report For Kahikinui Driveway Improvements Project Phase 1, Kahikinui, Maui, Hawaii dated November 15, 2019.

B. Imported Fill material, as specified in Section 02200 and Geotechnical Exploration Report For Kahikinui Driveway Improvements Project Phase 1, Kahikinui, Maui, Hawaii dated November 15, 2019.

C. Aggregate material as specified in Section 02227.

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify all lines, elevations and grades necessary to construct driveway and bases as shown in the plans and specifications.

B. Carefully protect benchmarks, property corners, monuments or other reference points.

C. Locate and identify all site utilities that have previously been installed and may be in danger of damage by grading operations.

D. Locate and identify all existing utilities that are to remain and protect them from damage.

E. Over excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas shall be stabilized by using acceptable aggregate material placed and compacted as specified.

3.2 EXCAVATION

A. Excavate roadway and pavement areas to line and grade as shown in the plans and specifications.

B. Engage all suitable material into the project fill areas as specified in Section 02200.

C. Unsuitable excavated material is to be disposed of in a manner and location that is acceptable to the Owner and local governing agencies.

D. Perform excavation using capable, well-maintained equipment and methods acceptable to the Geotechnical Engineering Representative and the project document requirements.

3.3 COMPACTION

A. Maintain optimum moisture content of fill materials to attain required compaction density.

B. All materials shall be tested in accordance with Section 02200.

C. An independent testing laboratory hired by the Contractor shall perform testing on-site.

D. Compaction test for on-site pavement areas will be as specified in Section 02200 together with the following for paving areas:

1. In cut areas not less than one compaction test for every 10,000 square feet.

2. In fill areas, same rate of testing for each 8" lift (measured loose).

E. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to owner.

F. Compact fills in 8-inch loose lifts. The pavement subgrade should be scarified to a minimum depth of 6 inches, moistened to about 2 percent above optimum moisture content, and compacted to a minimum 95 percent compaction as determined by ASTM D 1557. The base course and select borrow should also be compacted to a minimum 95 percent compaction as determined by ASTM D 1557.

3.4 MAINTENANCE OF SUBGRADE

A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.

B. Protect subgrade from excessive wheel loading during construction including concrete trucks and dump trucks.

C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on-site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.5 FINISH GRADE

A. Finish grading shall be in accordance with Section 02200 and as more specifically stated herein.

B. Grading of paving areas shall be checked by string line from grade stakes (blue tops) set at not more than 50' centers. Tolerances of 0.20 feet, more or less, will be permitted. Contractor to provide engineering and field staking necessary for verification of lines, grades, and elevations.

END SECTION

SECTION 02227 - AGGREGATE MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SECTION INCLUDES

A. Aggregate Materials

B. Imported Borrow

1.3 RELATED WORK

A. Section 02100 - Site Preparation

B. Section 02200 ï Earthwork

C. Construction Drawings

D. Hawaii Standard Specifications for Road and Bridge Construction, State of Hawaii, Department of Transportation, Highways Division, 2005 and current amendments (Paragraphs on Measurement and Payment do not apply to this project.)

E. Standard Details for Public Works Construction, County of Maui, dated September 1984 with all amendments.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM) latest edition.

1.	ANSI/ASTM C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
2.	ANSI/ASTM D1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
3.	ASTM D2167	Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
4.	ASTM D2487	Classification of Soils for Engineering Purposes.
5.	ASTM D2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6.	ASTM D3017	Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
7.	ASTM D4318	Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.

1.	AASHTO T180	Moisture-Density Relations of Soils Using a 10-lb (4.54 Kg) Rammer and an 18 inch (457 mm) Drop.

2. AASHTO M147 Materials for Aggregate and Soil-Aggregate

1.5 QUALITY ASSURANCE

A. Tests and analysis of aggregate material will be performed in accordance with standard ASTM and AASHTO procedures listed herein.

1.6 SUBMITTAL

A. Submit in airtight containers a 10 pound sample of each aggregate or mixture that is to be incorporated into the project to the testing laboratory designated by the Contractor.

B. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the Ownerôs Representative.

C. Submit materials certificate to on-site independent testing laboratory, which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate base materials should consist of crushed basaltic aggregates and should conform to Section 31 of the City and County of Honolulu, Department of Public Works, ñStandard Specifications for Public Works Construction,ò dated September 1986. Imported fill materials should be tested for conformance with these recommendations prior to delivery to the project site for the intended use.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Stockpile on-site at locations indicated by the Owner in such a manner that there will be no standing water or mixing with other materials.

3.2 BORROW SITES

A. Upon completion of borrow operations, clean up borrow areas as indicated on the plans in a neat and reasonable manner to the satisfaction of the property owner, the Owner and the Ownerôs Representative.

3.3 TRANSPORTATION

A. Off-site materials shall be transported to the project using well maintained and operating vehicles. Once on the job site, all transporting vehicles shall stay on designated haul roads and shall at no time endanger any of the improvements by rutting, overloading or pumping the haul road.

END SECTION

SECTION 02270 - SLOPE PROTECTION AND EROSION CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Detailed plans, diagrams, and written site-specific best management practices (BMP); constructing, maintaining, and repairing temporary water pollution, dust, and erosion control measures at the project site, including local material sources, Owner provided borrow site, work areas and haul roads; removing and disposing hazardous wastes; control of fugitive dust (defined as uncontrolled emission of solid airborne particulate matter from any source other than combustion); and complying with applicable County, State and Federal permit conditions.

B. Work associated with dewatering activities and complying with conditions of the National Pollutant Discharge Elimination System (NPDES) general permit coverage authorizing discharges associated with construction activity dewatering.

C. Slope Protection Systems.

1.2 RELATED WORK

A. Section 02100 - Site Preparation

B. Section 02200 - Earthwork

C. Erosion Control Plan

D. Construction Drawings

1.3 ENVIRONMENTAL REQUIREMENTS

A. The contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract.

B. The contractor shall be responsible for stormwater management practices per the NPDES permit obtained for this project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Quick growing grass such as rye. Grass shall be suitable to the area and provide a temporary cover that will not compete later with permanent cover.

B. Hay or straw bales.

C. Silt Fences. Silt fences shall be synthetic filter fabric mounted on steel posts and embedded in compacted ground in accordance with contract documents,

and shall be in compliance with ASTM D 6462, Standard Practice for Silt Fence Installation. Silt fence posts shall be spaced a maximum of 6 feet apart.

D. Curlex blankets by American Excelsior Company or approved equal.

E. Erosion Control/Turf Reinforcement Matting by North American Green or approved equal.

F. Bale stakes for each bale shall be a minimum of 4 feet in length and shall be either 2 #4 rebars, 2 steel pickets or 2-2"x2" hardwood stakes driven 1'-6" to 2'-0" into ground.

G. Temporary mulches such as loose hay, straw, netting, wood cellulose or agricultural silage.

H. Fence stakes shall be metal stakes a minimum of 3 feet in length.

PART 3 - EXECUTION

3.1 PREPARATION

A. Review site erosion control plan.

B. Deficiencies or changes in the erosion control plan as it is applied to current conditions will be brought to the attention of the Owner's Representative and the Engineer for remedial action.

3.2 PRECONSTRUCTION REQUIREMENTS

A. Water Pollution, Dust, and Erosion Control Meeting. Submit site specific BMP to Engineer. Schedule a water pollution, dust, and erosion control meeting with Engineer after site specific BMP is accepted in writing by Engineer. Meeting shall be scheduled 14 days before start of construction work. Discuss sequence of work, plans and proposals for water pollution, dust, and erosion control.

B. Water Pollution, Dust, and Erosion Control Submittals.

Submit the following:

1. Written site-specific BMP describing activities to minimize water pollution and soil erosion into State waters, drainage or sewer systems. BMP shall include the following:

   a. An identification of potential pollutants and their sources.

   b. A list of all materials and heavy equipment to be used during construction.

   c. Descriptions of the methods and devices used to minimize the discharge of pollutants into State waters, drainage or sewer systems.

d. Details of the procedures used for the maintenance and subsequent removal of any erosion or siltation control devices.

e. Methods of removing and disposing hazardous wastes encountered or generated during construction.

f. Methods of removing and disposing concrete and asphalt pavement cutting slurry, concrete curing water, and hydrodemolition water.

g. Spill control.

h. Fugitive dust control, including dust from grinding, sweeping, or brooming off operations or combination thereof.

i. Methods of storing and handling of oils, paints and other products used for the project.

j. Material storage and handling areas, and other staging areas.

k. Concrete truck washouts.

l. Concrete waste control.

m. Fueling and maintenance of vehicles and other equipment.

n. Tracking of sediment offsite from project entries and exits.

o. Litter management.

p. Toilet facilities.

q. Other factors that may cause water pollution, dust and erosion control.

2. Provide plans indicating location of water pollution, dust and erosion control devices; provide plans and details of BMPs to be installed or utilized; show areas of soil disturbance in cut and fill, indicate areas used for storage of aggregate (indicate type of aggregate), soil or waste, and show areas where vegetative practices are to be implemented. Indicate intended drainage pattern on plans. Include separate drawing for each phase of construction that alters drainage patterns. Indicate approximate date when device will be installed and removed.

3. Construction schedule.

4. Name(s) of individual(s) designated responsible for water pollution, dust, and erosion controls on the project site. Include home and business telephone numbers, fax numbers, and e-mail addresses.

5. Description of fill material to be used.

6. Date and sign BMP. Keep accepted copy on site throughout duration of the project. Revisions to the BMP shall be included with original BMP. Modify contract documents to conform to revisions. Include actual date

of installation and removal of BMP. Obtain written acceptance by Ownerôs Representative before revising BMP.

3.3 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

A. Place erosion control systems in accordance with the erosion control plan and applicable details prior to clearing, grubbing and earthwork in construction areas.

B. The Ownerôs Representative has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.

C. The temporary erosion control systems installed by the Contractor shall be maintained as directed by the Ownerôs Representative to control siltation at all times during the life of the contract. The Contractor must respond to any maintenance or additional work ordered by the Ownerôs Representative within a 24 hour period.

D. Temporarily reroute surface drainage runoff from entering construction areas through use of interceptor ditches, berms and level spreaders. Contractor shall insure that discharge points do not concentrate flows, thereby, causing erosion to downstream areas. Install erosion protection and flow dissipators downstream to prevent erosion.

E. Any additional material and work required and authorized by the Ownerôs Representative, which is beyond the extent of the erosion control plan, shall be paid for by the Owner.

F. Slopes that erode easily shall be temporary seeded as the work progresses with a wheat, rye or oats application, or temporary slope drains shall be provided to carry runoff from cuts and embankments.

G. Place permanent erosion control features in accordance with the construction plans and details, and recommended manufacturer guidelines.

3.4 CONSTRUCTION REQUIREMENTS

A. Do not begin work until submittals detailed in Subsection 3.2(B) ï Water Pollution, Dust, and Erosion Control Submittals are completed and accepted in writing by Engineer.

B. Install, maintain, monitor, repair and replace site-specific BMP measures, such as for water pollution, dust and erosion control; installation, monitoring, and operation of hydrotesting activities; removal and disposal of hazardous waste indicated on plans, concrete cutting slurry, concrete curing water; or hydrodemolition water.

C. Furnish, install rain gage in a secure location for projects that require NPDES permit from the Department of Health prior to field work including installation of site-specific BMP. Provide rain gage with a tolerance of at least 0.05 inches of rainfall, and an opening of at least 1-inch diameter. Install rain gate on project site in an area that will not deter rainfall from entering the gage opening. Maintain rain gage and replace rain gage that is stolen, does not function properly or accurately, is worn out, or needs to be relocated. Do not begin field work until rain gage is installed and site specific BMPs are in place. Do not begin field work until rain gage is installed and site specific BMPs are in place.

D. Modify and resubmit plans and construction schedules to correct conditions that develop during construction which were unforeseen during the design and pre-construction stages. Coordinate temporary control provisions with permanent control features throughout the construction and post-construction period.

E. Limit the maximum surface area of earth material exposed at any time to 10-acres. Do not expose or disturb surface area or earth material (including clearing and grubbing) until BMP measures are installed and accepted in writing by Engineer. Protect temporarily or permanently disturbed soil surface from rainfall impact, runoff and wind before end of workday.

F. Protect exposed or disturbed surface area with mulches, grass seeds or hydromulch. Spray mulches at a rate of 2,000 pounds per acre. Add tackifier to mix at a rate of 85 pounds per acre. Apply grass seeds at a rate of 125 pounds per acre. For hydromulch, use the ingredients and rates required for mulches and grass seeds. Apply fertilizer to mulches, grass seed or hydromulch at a rate of 450 pounds per acre. Apply an additional 250 pounds per acre every 90 calendar days. Finished building pads shall be mulched but not seeded, unless otherwise directed by the Owner's Representative.

H. Install velocity dissipation measures when exposing erodible surfaces greater than 15-feet in height.

I. BMP measures shall be in place and operational (such as shaping the earthwork to control and directing the runoff) at the end of workday. Shaping earthwork may include constructing earth berms or interceptor ditches along the top edges of embankments if acceptable to Engineer.

J. Install and maintain stabilized construction entrances and wheel washes to minimize tracking of dirt and mud onto roadways. Restrict traffic to stabilized construction areas only. Clean dirt, mud, or other material tracked on the road immediately. Modify stabilized construction entrances to prevent mud from being tracked onto road. Stabilize entire access roads if necessary.

K. Protect ditches, channels and other drainageways leading away from cuts and fills at all times by:

i. Hydro-mulching the lower region of embankments in the immediate area.

ii. Placing an 8- to 15-inch layer of excavated rock, if available on-site, without reducing the cross section of the drainageway. Rocks shall be less than 4-inches in diameter.

iii. Installing check dams and other velocity dissipation devices.

iv. Other methods acceptable to Engineer

L. Provide for controlled discharge of waters impounded, directed or controlled by project activities or erosion control measures.

M. Cover exposed surface of materials completely with tarpaulin or similar device when transporting aggregate, soil, excavated material or material that may be source of fugitive dust.

N. Clean-up and remove any pollutant that can be attributed to Contractorôs operations.

O. Install or modify BMP measures due to change in Contractorôs means and methods, or for field revisions or omitted conditions to the accepted site specific BMP. Contractor shall insure the satisfactory performance of the BMP at all times.

3.5 BMP REPORT SUBMITTALS

A. Properly maintain all BMP features. Inspect, prepare a written report and make repairs to BMP measures at following intervals:

1. Weekly during dry periods.

2. Within 24-hours of any rainfall of 0.5-inch or greater which occurs in a 24-hour period.

3. Daily during periods of prolonged rainfall.

4. When existing erosion control measures are damaged or not operating properly as required by site specific BMP.

B. Maintain records of inspections of BMP work. Keep continuous records for duration of the project. Submit weekly copy of records to Ownerôs Representative. Remove, destroy, replace or relocate any BMP that must be removed, destroyed, replaced or relocated due to potential or actual flooding, or potential danger or damage to project or public.

C. Contractorôs designated representative shall address any BMP concerns brought up by Ownerôs Representative or Engineer within 24-hours of notification, including weekends and holidays. In the event of Contractorôs failure to satisfactorily address these concerns, Owner reserves the right to

employ outside assistance to provide necessary corrective measures. Owner will charge Contractor such costs incurred, such as remedial costs and fines, plus any associated project engineering costs. Owner will make appropriate deductions from Contractorôs monthly progress estimate. Failure to apply BMP measures shall result in either or both the establishment and increase in the amount of retainage due to unsatisfactory progress or withholding of monthly progress payment. Continued failure to apply BMP measures may result in one or more of the following: assessment of liquidated damages, suspension, or cancellation of contract with Contractor being fully responsible for all additional costs incurred by Owner, including any fines, penalties, and remedial costs.

3.6 HYDROTESTING ACTIVITIES

If work includes removing, relocating or installing waterlines, and Contractor elects to flush waterline or discharge hydrotesting effluent into State waters or County drainage systems, submit site specific information to the State Department of Health, Clean Water Branch (DOH-CWB). Do not begin hydrotesting activities until the DOH-CWB has issued a Notice of General Permit Coverage (NGPC). Hydrotesting operations shall be in accordance with conditions in NGPC. Submit a copy of the NPDES Hydrotesting Waters Application and Permit to Engineer.

3.7 DEWATERING ACTIVITIES

If excavation or backfilling operations require dewatering, and Contractor elects to discharge dewatering effluent into State waters or existing drainage systems, obtain NPDES General Permit Coverage authorizing discharges associated with construction activity dewatering from Department of Health, Clean Water Branch (DOH-CWB). If permit is required, prepare and submit permit application (CWB-NOI Form G) to DOH-CWB. Do not begin dewatering activities until DOH-CWB has issued Notice of General Permit Coverage (NGPC). Conduct dewatering operations in accordance with conditions in NGPC. Submit copy of NPDES Hydrotesting Waters Application and Permit to Engineer.

3.8 STORMWATER RUNOFF CONTROL PRACTICES AND MAINTENANCE PLAN

For the entire construction period, prior to acceptance of the site by the Owner or Building Contractor, the Site Contractor shall adhere to the Stormwater Runoff Control Practices and Maintenance Plan in addition to the provisions in these Technical Specifications.

END OF SECTION

SECTION 02505 – PAVING BASE COURSE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SECTION INCLUDES

A. Aggregate Base Course

1.3 RELATED WORK

A. Section 02100 - Site Preparation

B. Section 02200 ï Earthwork

C. Section 02227 - Aggregate Materials

D. Construction Drawings

E. Hawaii Standard Specifications for Road and Bridge Construction, State of Hawaii, Department of Transportation, Highways Division, 2005 and current amendments (Paragraphs on Measurement and Payment do not apply to this project).

1.4 REFERENCE STANDARDS

A.	ANSI/ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop
B.	ASTM D 1883	California Bearing Ratio (CBR) of Laboratory-Compacted Soils
C.	ASTM D 2167	Test Method for Density and Unit Weight of Soil in-place by the Rubber Balloon Method
D.	ASTM D 1556	Test Method for Density of Soil in-place by the Sand-Cone Method
E.	ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in-place by Nuclear Methods (Shallow Depth), Method B (Direct Transmission).
F.	ASTM D 3017	Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures
G.	ASTM D 422	Method for Particle Size Analysis of Soils
H.	ASTM D 4318	Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate base course shall conform to Section 304 Ь AGGREGATE BASE COURSE of the Standard Specifications.

2.2 SUBMITTALS

A. Submit materials certificate to on-site independent testing laboratory which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall verify that the subgrade has been inspected, tested and the gradients and elevations are correct, dry and properly prepared.

3.2 CONSTRUCTION

A. Aggregate base and subbase course materials should be moisture conditioned to above the optimum moisture content, placed in level lifts not exceeding 8 inches in loose thickness, and compacted to a minimum of 95 percent relative compaction.

1. Relative compaction refers to the in-place dry density of soil expressed as percentage of the maximum dry density of the same soil established in accordance with ASTM Test designation D 1557. The optimum moisture content is the moisture content corresponding to the maximum compacted dry density.

2. Compaction should be accomplished by sheepsfoot rollers, vibratory rollers, or other types of acceptable compaction equipment. Water tamping, jetting, or ponding should not be allowed to compact the fills. Where compaction is less than required, additional compactive effort should be applied with adjustment of moisture content as necessary, to obtain the specified compaction. It should be noted that excessive vibrations from compaction equipment may soften the on-site soils with high in-situ moisture contents; therefore, vibrations should be carefully controlled during compaction efforts.

3.3 FIELD QUALITY CONTROL

A. An Independent Testing Laboratory, selected and paid by the Contractor, shall perform construction testing of in-place base courses for compliance with requirements for thickness, compaction, density and tolerance. Paving base course tolerances shall be verified (by rod and level readings on not more than fifty-foot centers) to be not more than 0.10 foot above design elevation which will allow for paving thicknessôas shown in the Drawings. Contractor shall provide instruments and a suitable benchmark.

B. The following tests shall be performed on each type of material used as base course material:

1. Moisture and Density Relationship: ASTM D 1557
2. Mechanical Analysis: ASTM D 422
3. Plasticity Index: ASTM D4318
4. Base material thickness: Perform one test for each 1,000 square feet of in-place base material area.
5. Base material compaction: Perform one test in each lift for each 1,000 square feet of in-place base material area.
6. Test each source of base material for compliance with the requirements of these specifications.

C. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements:

1. Sand-Cone Method: ASTM D1556
2. Balloon Method: ASTM D2167
3. Nuclear Method: ASTM D2922, Method B (Direct Transmission)

D. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. The Owner, Engineer, and Contractor shall be provided two copies of the reports within 96 hours of time test was preformed. In event that any test preformed fails to meet these Specifications, the Owner, Engineer, and Contractor shall be notified immediately by Independent Testing Laboratory. The Owner reserves the right to direct any testing that is deemed by them to be necessary. Contractor shall provide free access to site for testing activities.

E. Work must conform to Sections 304 of the Standard Specifications.

END SECTION

DIVISION 3 – CONCRETE

SECTION 03100 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SCOPE

A. This section includes formwork for cast-in-place concrete, with shoring, bracing and anchorage; openings for other work; form accessories; and form stripping.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation

B. American Concrete Institute (ACI)

1. ACI 301-99 Structural Concrete for Buildings
2. ACI 318-02 Building Code Requirements for Reinforced Concrete
3. ACI 347R-01 Recommended Practice for Concrete Formwork

C. U.S. Department of Commerce Voluntary Product Standard

1. PS 1 Construction and Industrial Plywood

1.3 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to code requirements; resultant concrete to conform to required shape, line and dimension.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 347.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable codes for design, fabrication, erection and removal of formwork.

1.6 COORDINATION

A. Coordinate this section with other sections of work which require attachment of components to formwork.

PART 2 - PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.2 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

2.3 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

2.4 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, galvanized metal, fixed or adjustable length, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Corners: Fillet, chamfer, rigid plastic or wood strip.

D. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members which are not indicated on drawings.

F. Provide fillet and chamfer strips on external corners of beams, joists and columns.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where it is not compatible with special finishes or coverings to be applied to concrete surfaces. Form release agent shall be compatible with the type of finish selected. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.4 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.

E. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight. Provide additional waterstop supports where indicated.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight-fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.5 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.6 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.7 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties and items are secure.

3.8 FORM REMOVAL

A. The listing below shall be used in determining the minimum length of time required before removal of forms can occur.

1. Walls, columns and vertical side of beams: 3 days

B. Form and shore removal for load supporting structural elements will not be permitted until 7-day cylinder tests confirm that concrete is sufficiently strong to support its own weight and any construction live loads.

C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

D. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END SECTION

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SCOPE

A. This section includes reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Concrete Institute (ACI)

1. ACI 301-99 Specifications for Structural Concrete
2. ACI 315-99 American Concrete Institute ï Detailing Manual
3. ACI 318-14 Building Code Requirements for Reinforced Concrete

C. American Society for Testing and Materials (ASTM)

1. ASTM A82-94 Cold Drawn Steel Wire for Concrete Reinforcement
2. ASTM A615-94 Deformed and Plain Billet Steel Bars for Concrete Reinforcement

D. Uniform Building Code (UBC), 1997 Edition.

1.3 SUBMITTALS

A. Submit the following, in addition to the requirements of Section 172:

1. Shop drawings for reinforcement shall conform to ACI 315, and shall indicate bending diagrams, assembly diagrams, supporting devices, bar dimensions, details, laps and splices. Drawings shall be numbered and dated with each issue. Changes on re-submittals shall be identified with a cloud and a revision number.
2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
3. Review of shop drawings will be for adherence to overall basic design, and will not relieve Contractor from compliance with Contract Documents nor from his responsibility for correctness of dimensions, proper design of details, quantities, field fit and coordination with other trades.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301 and ACI 315.

B. Engineer reserves the right to request and review test reports and other data demonstrating compliance with specifications.

C. Submit certified copies of mill test report of reinforcement materials analysis.

D. When reinforcing steel does not bear stamped identification, the Owner's Representative shall require certified copies of mill reports for the first delivery of reinforcing steel, and for each 15 tons thereafter.

E. Contractor shall hire at his own expense, an independent licensed special inspector. Special inspector shall certify that installation of the reinforcing bars is in conformance with the plans.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars.

B. Welded Steel Wire Fabric: ASTM A185, galvanized.

C. For Fiber Reinforced Concrete option, refer to section 719 – Macro-Synthetic Fibers for Concrete Reinforcement from the Hawaii State Standard Specifications, 2005.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

C. Special Chairs, Bolsters, Bar Supports and Spacers: Plastic coated steel or stainless steel type with plastic tips; size and shape as required.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 315 and ACI 318.

B. Welding of reinforcement is not permitted unless specifically shown on plans or approved by the Engineer.

C. Reinforcing steel shall be free of grease, oil, dirt, cement laitance and mill scale; light rusting is acceptable.

D. All laps and splices shall be as indicated.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Support and wire reinforcement bars to prevent displacement by construction loads or during concrete placement. Do not bend bars partially embedded in hardened concrete. All metal chairs for supporting reinforcement shall be equipped with plastic tips.

B. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the tolerances of ACI, the resulting arrangement of bars shall be subject to Engineer and Owner's Representative's approval.

C. Accommodate placement of formed openings.

D. Conform to ACI 318 for concrete cover over reinforcement, unless otherwise noted on drawings.

E. Do not displace or damage vapor barrier.

3.2 FIELD QUALITY CONTROL

A. Reinforcing steel must not be covered until the installation of the steel has been approved by the Engineer and Owner's Representative.

END SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SCOPE

A. This section includes cast-in-place concrete structures; other drainage structures; control and construction joint devices associated with concrete work; and accessories including bonding agents, vapor barriers, curing materials, and grout.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Concrete Institute (ACI)

1.	ACI 301-99	Specifications for Structural Concrete
2.	ACI 302.1R-96	Guide for Concrete Floor and Slab Construction
3.	ACI 304R-00	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
4.	ACI 305R-99	Hot Weather Concreting
5.	ACI 308R-01	Standard Practice for Curing Concrete

C. American Society for Testing and Materials (ASTM)

1.	ASTM C31-91	Making and Curing Concrete Test Specimens in the Field
2.	ASTM C33-93	Concrete Aggregates
3.	ASTM C39-93a	Test for Compressive Strength of Cylindrical Concrete Specimens
4.	ASTM C94-94	Ready-Mixed Concrete
5.	ASTM C143-90a	Test for Slump of Portland Cement Concrete
6.	ASTM C150-94	Portland Cement
7.	ASTM C157-93	Length Change of Hardened Cement Mortar and Concrete
8.	ASTM C171-92	Sheet Materials for Curing Concrete.
9.	ASTM C227-90	Potential Alkali Reactivity of Cement Aggregate Combinations (Mortar-Bar Method)
10.	ASTM C295-90	Petrographic Examinations of Aggregates for Concrete

11.	ASTM C309-93	Liquid Membrane-Forming Compounds for Curing Concrete
12.	ASTM C494-92	Chemical Admixtures for Concrete
13.	ASTM D1751-83(1991)	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction

D. U.S. Army Corps of Engineers CRD-C-572

1.3 SUBMITTALS

A. Concrete Mix Design:

1. Completely identify the make-up of concrete mixes, identifying the type and quantity of each component and the manufacturer of each admixture.

2. Portland Cement: Furnish a certificate, including the test data, indicating the type of cement used for the job and compliance with ASTM C150.

3. Fine and Coarse Aggregate: Submit test data.

4. Submit trial batch data on slump, shrinkage and compressive strength.

5. The Contractor shall make the above submittals so as not to delay the job realizing the time requirements of the above tests.

B. Product Data: Provide data on joint devices, and attachment accessories.

C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Conform to ACI 305R when concreting during hot weather.

C. Engineer and Owner's Representative reserves the right to request and review test reports and other data demonstrating compliance with specifications.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type II. For exposed concrete, use the same brand of cement throughout.

B. Aggregates:

1. Coarse Aggregate: ASTM C33, No. 57 or 67, basaltic aggregate only. Limestone and coral aggregate is unacceptable.

2. Fine Aggregate: ASTM C33. Manufactured sands that produce a slippery slab surface shall not be accepted.

C. Water: Clean and not detrimental to concrete. ACI 301, Section 2.3.

2.2 ADMIXTURES

A. Chemical: ASTM C494 Type A - Water Reducing, Type D - Water Reducing and Retarding.

B. Corrosion Inhibitors: "DCI" manufactured by W.R. Grace or approved equal.

2.3 ACCESSORIES

A. Bonding Agent: Polymer resin emulsion or polyvinyl acetate or latex emulsion or two-component modified epoxy resin or non-solvent two-component polysulfide epoxy or mineral filled polysulfide polymer epoxy or mineral filled polysulfide polymer epoxy resin or polyacid cured epoxy.

B. Vapor Barrier: 10 mil thick clear polyethylene film or fabric reinforced plastic film type recommended for below grade application.

C. Curing Materials: ACI 301, Section 12.1 modified as follows:

1. Curing Compound: ASTM C309, Type 1-D, Class B, clear or translucent, with fugitive dye to provide visual check of coverage.

2. Waterproof Sheeting Materials: ASTM C171, waterproof paper, 4 mil polyethylene film or white burlap-polyethylene sheet, with pressure sensitive tape for sealing laps.

D. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate and non-staining type cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 4,000 psi in 3 days and 7,000 psi in 28 days; "Masterflow 928" manufactured by Master Builders, or approved equal.

E. Repair Grout: Sika Corp. "Sika Top 122" or approved equal except overhead and vertical repairs, use "Sika Top 123 Plus" or "Thorite 100", or approved equal.

2.4 JOINT DEVICES AND FILLER MATERIALS IN THE FIELD

A. Joint Filler: ASTM D1751 or ASTM D994; asphalt impregnated fiberboard or felt, 1/2 inch thick.

B. Construction Joint Devices:

1. Joints shall be formed as indicated.

2.5 CONCRETE MIX

A. Prepare design mixes in accordance with ACI 301 and 318. Proportion design mixes by weight in accordance with ACI 211.1.

1. Compressive strength at 28 days: 5,000 psi.

a) Water/cement ratio by weight: Not to exceed 0.40.

b) Slump: Maximum of 4" without reducing or high-range dmixtures.

c) Maximum nominal size aggregate: 3/4 inch.

2. Compressive strength at 28 days: 3,000 psi.

a) Water cement ratio by weight: Not to exceed 0.50.

b) Slump (without addition of admixtures)

1) Maximum of 5" for slabs.

2) Maximum of 4" for all others.

c) Maximum nominal size aggregate: 3/4 inch.

3. Compressive strength at 28 days: 2,000 psi

a) Water/cement ratio by weight: Not to exceed 0.68.

b) Maximum Slump: 5".

c) Maximum nominal size aggregate: one inch.

B. Mix Design: By selected ready-mix supplier and approved by the Engineer and Owner's Representative.

1. Mix Designs: Compressive strengths shall be established for each mix design according to ACI 318 Section 4.3.

2. Only the admixtures specified under this section will be permitted in concrete. Mix designs shall take into account all admixtures required or proposed for use. When more than one type of admixture is used, they shall be of same manufacturer whenever possible, and must be compatible in all cases. Admixtures, except high-range admixture, shall be added at the batch plant. High-range admixture may be added at the batch plant or job site.

a) Water reducing admixture shall be used in concrete for all floor slabs and other traffic areas, and may be used in other concrete. High-range admixture may be used in lieu of a water reducing admixture; it shall be added in the amount required to obtain proper workability.

b) The type and dosage of high-range admixture shall be chosen with allowance for delivery time, stand-by time and time for placing and finishing concrete without any premature hardening of concrete.

c) Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by roughening surface to 1/4 inch amplitude, removing laitance and blowing surface clean before placement of adjacent concrete.

B. If noted on drawings, prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

C. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.3 JOINTS AND EMBEDDED ITEMS

A. ACI 301, Chapter 6 and as shown on drawings.

1. Joints shall be located and constructed as shown and as detailed on drawings. No joints shall be permitted where not indicated on drawings without prior approval of the Engineer and Owner's Representative.

2. Joint sealant or filler shall be installed according to manufacturer's requirement.

3. Waterstops shall be installed in the center of the joints noted on drawings. Provide manufacturer fabricated joints. Heat seal straight butt joint in the field. Waterstops shall be securely held in position during placement of concrete.

3.4 PLACING CONCRETE

A. Notify the Owner's Representative a minimum 24 hours prior to commencement of operations.

B. Placement: ACI 301, Chapters 7 and 8, with the following modifications:

1. Concrete shall not be placed until items stated in this specification. Items included:

a) Approved concrete mix designs including test data and certificate.

b) Approved shop drawing submittals including reinforcement and embedded items.

c) Inspection and approval of conduit, piping, ancillary equipment to be embedded in the concrete.

d) Approval by Soil Engineer on tested subgrade.

e) Moistened subgrade.

f) Water proofing where indicated.

2. Water shall not be added to concrete at the job site except as noted in Paragraph 3.5 Production of Concrete, below. If more workability of the concrete is needed, high range admixture may be added and used in lieu of water-reducing mixture.

3. When air temperature is between 45°F and 85°F, the maximum concrete temperature at the time of placement shall not exceed the air temperature plus 10°F, nor 85°F, whichever is lower. The minimum concrete temperature at the time of placement shall not be less than 50°F.

4. Concrete delivered in hot weather (when air temperature will exceed 85°F) shall be placed in accordance with ACI 305R and as modified hereunder. Concrete shall have a temperature not to exceed 85°F. The following precautions shall be taken: The forms, reinforcement and underlying material shall be sprinkled with water immediately before

placing concrete. The aggregate and/or mixing water shall be cooled to meet specifications.

5. Contractor shall take measures to prevent plastic shrinkage cracking and crazing. Plastic shrinkage cracks must be repaired at Contractor's expense in manner subject to the Engineer and/or Owner's Special Inspector's review.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

D. Form and shore removal shall be as specified in Section 03100, "CONCRETE FORMWORK".

E. Concrete shall not be permitted to fall or dropped more than 4 feet over waterstops. Use hoses and pumps as required.

F. Contractor shall be familiar with concrete setting time variations with the different admixtures.

3.5 PRODUCTION OF CONCRETE

A. Concrete shall be in accordance with ASTM C94. No water shall be added to the mix after departing the concrete plant, except as noted below.

B. ACI 301, Chapter 7. Use ready-mix concrete for all work.

1. Delivery ticket for each batch of ready-mixed concrete shall give the following information:

a) Name of ready-mix batch plant.

b) Serial number of ticket.

c) Date and truck number.

d) Name of Contractor.

e) Specific designation of job (name and location).

f) Design mix designation.

g) Amount of concrete (cubic yards)

h) Time loaded.

i) Type and name of admixture and amount of same.

j) Type and brand of cement.

k) Amount of cement.

l) Total water content by producer (or W/C ratio).

m) Maximum size of aggregate.

n) Weights of fine and coarse aggregate.

o) Indication that all ingredients are as previously certified or approved.

p) Amount of water which may be added at the jobsite and still conform to the approved mix design and water to cement ratios. If

no amount is indicated, no water can be added to the mix at the site.

2. On-site acceptance by the Owner's Special Inspector of ready-mix concrete for placement shall be predicated on the following:

   a) The delivery ticket is in accordance with the previously approved mix for the specific placement being undertaken.

   b) That not more than 1-1/4 hours have expired between the time shown on the delivery ticket and the time of placement.

   c) That the slumps are within limits specified.

   d) Unauthorized addition of water shall be just cause for rejecting the concrete.

   e) If any one of the above conditions are not met, Owner's Special Inspector may reject the load and order it returned to the batch plant at no expense to the Owner.

3.6 CONCRETE FINISHING

A. ACI 301, with the following modifications:

1. Exposed Formed Surfaces: ACI 301, Section 10.2.2, Smooth form finish.

2. Concealed Formed Surfaces: ACI 301, Section 10.2.1, rough form finish.

3. Refer to drawings and specifications for wall finishes.

4. Slabs: ACI 301, Chapter 11. Use steel troweled finish with Class A tolerance (1/8 inch tolerance in 10 feet) for interior floors, and broom finish or burlap drag finish for exterior ramps, aprons, and exterior concrete pavements.

3.7 CURING AND PROTECTION

A. ACI 301, Chapter 12, with the following modifications:

1. Total curing period shall be ten (10) days at ambient air temperature not less than 50°F.

3.8 FIELD QUALITY CONTROL

A. The Owner shall provide one licensed inspector for all reinforcing steel inspections and for concrete inspections. No concrete forms shall be closed until the inspections are completed.

B. Contractor shall provide, cooperate and coordinate with the approved testing laboratory to assure proper performance of all required testing services. Promptly deliver concrete samples, furnish mill test reports of cement and reinforcing steel, advise laboratory in advance of concrete deliveries, furnish sample containers and assist in obtaining samples and handling specimens, and provide necessary facilities at site for storage and curing.

C. Concrete Tests: ACI 301, Chapters 16 and 17, except as modified below:

1. Slump Test: One slump test shall be taken for each truck load of concrete prior to placement, in order to assure compliance with specified slumps. Slump tests shall be in accordance with ASTM C143 and shall be taken at

the truck chute (not at the end of the pump line for pumped concrete). If high-range admixture is used, slump tests shall be done in field after addition of high-range admixture.

2. Compression Tests:

a) A sample shall consist of taking six cylinders made and cured in accordance with ASTM C31. Two cylinders shall be tested at 7 days, two at 28 days, and two will be held. Testing of cylinders shall be in accordance with ASTM C39.

b) The number of concrete samples to be taken shall be the maximum, required by any one of the following criteria:

1) One sample for each 150 cu. yd. of concrete or portion thereof.

2) One sample for each 5,000 sq. ft. of surface area.

3) One sample for each day of placement.

4) One sample for each mix design.

5) Two samples for any concrete in excess of six truck loads.

c) A test result will be the average of two cylinder breaks.

d) Samples shall be taken randomly. Results shall be identified with respect to location (i.e. structure type, at column lines).

e) The laboratory shall report test results to the Engineer, Owner, and Contractor within 48 hours in writing.

3.9 PATCHING

A. Allow the Owner's Special Inspector to inspect concrete surfaces immediately upon removal of forms.

B. Honeycombing or embedded debris in concrete is not acceptable. Notify Owner's Special Inspector upon discovery.

C. Patch imperfections under the direction of the Engineer and/or Owner's Special Inspector in accordance with ACI 301.

3.10 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Owner's Special Inspector or the Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Owner's Special Inspector for each individual area.

D. Contractor to repair defective concrete, as directed by Owner's Special Inspector.

END SECTION

SECTION 03600 - GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

This section specifies grout for uses other than masonry.

1.02 QUALITY ASSURANCE

A. QUALITY CONTROL BY CONTRACTOR

To demonstrate conformance with the specified requirements for grout, provide the services of an independent testing laboratory which complies with the requirements of ASTM E329. Sample and test grout materials by testing laboratory as required in this section. Costs of testing laboratory services be borne by the Contractor.

B. REFERENCES

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, apply the requirements of this section.

Reference	Title
Standard Specifications	Section 39-Portland Cement Concrete
ASTM C33	Concrete Aggregates
ASTM C40	Organic Impurities in Fine Aggregates for Concrete
ASTM C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Material Finer Than 75 ε m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C150	Portland Cement
Reference	Title
ASTM C289	Potential Reactivity of Aggregates (Chemical Method)
ASTM C494	Chemical Admixtures for Concrete
ASTM C881	Epoxy-Resin-Base Bonding Systems for Concrete
ASTM D2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM E329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

CRD-C621	Corps of Engineers Specification for Nonshrink Grout

1.03 SUBMITTALS

Submit the following information for review and approval in accordance with Section 01300.

A. MANUFACTURER'S DATA

Provide manufacturer's data for the following:

1. Bonding compounds
2. Nonshrink grout
3. Polymer concrete

B. LABORATORY TEST REPORTS

Accompany test reports on previously tested materials with the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project. Test reports are required for the following:

1. Cement
2. Aggregates
3. Retardants
4. Bonding compounds
5. Epoxy resin

C. EVIDENCE OF TESTING LABORATORY COMPETENCE

Require that the laboratory provide directly to the Construction Manager evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards. Provide evidence that the deficiencies mentioned in the report of that inspection have been corrected. Provide evidence of inspection prior to delivery of materials to the job site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. CEMENT

Portland cement specified in Section 39 of the standard specification.

B. AGGREGATE

1. GENERAL

Provide nonreactive aggregate and wash before use.

When sources of aggregate are changed, provide test reports for the new material. Perform tests specified prior to commencing grout work.

2. FINE AGGREGATE

Fine aggregate to be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine and conforming to ASTM C33 as modified herein. By gradation, when tested in accordance with ASTM C136, 100 percent by weight passes a standard No. 8 mesh sleeve and no less than 45 percent by weight passes a standard No. 40 mesh sieve.

Variation from the specified gradations in individual tests is acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

U.S. standard sieve size	Permissible variation in individual tests, percent
30 or coarser	2
50 or fine	0.5

Other tests in accordance with the following specifications:

Test	Test Method	Requirements
Organic Impurities	ASTM C40	Color lighter than standard
Amount of Material Passing No. 200 Sieve	ASTM C117	3% Maximum by weight
Soundness	ASTM C88	10% Maximum loss with sodium sulfate
Reactivity	ASTM C289	Innocuous aggregate
Sand Equivalent	ASTM D2419	Minimum 80

C. ADMIXTURES

1. GENERAL: Use compatible admixtures with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Use admixtures in accordance with the manufacturer's recommendations and add separately to the grout mix.

2. WATER REDUCING RETARDER: Use ASTM C494 Type D water reducing retarder and manufactured by Master Builders Pozzolith 300-R, Sika Corporation Plastiment, or equal.

3. LUBRICANT FOR CEMENT PRESSURE GROUTING: Lubricant additive for cement pressure grouting manufactured by Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.

D. WATER

Use water for washing aggregate, for mixing, and for curing that is free from oil and deleterious amounts of acids, alkalines, and organic materials; contains no more than 1,000 mg/1 of chlorides as Cl, nor more than 1,300 mg/1 of sulfates as SO_4; and does not contain an amount of impurities that may cause a change of more

than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water. Additionally, use water containing no amount of impurities sufficient to discolor the grout.

2.02 GROUT

A. DRYPACK GROUT

Drypack grout is a mixture of approximately one part cement, 1-1/2 to 2 parts sand, water reducing retarder, and sufficient water to make a stiff workable mix.

B. CEMENT GROUT

Cement grout is a mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.

C. NONSHRINK GROUT

Nonshrink grout is available with both metallic and nonmetallic aggregate. Use metallic aggregate grout manufactured by Master Builders Embeco 636, Burke Company Metallic Spec Grout, Sonnoborn Ferrolith G Redimix, or equal. Use nonmetallic aggregate grout manufactured by U.S. Grout Corp. Five Star grout, Master Builders Masterflow 713, Burke Company Non-Ferrous, Non-Shrink Grout, or equal.

D. POLYMER MODIFIED CEMENTICIOUS MORTAR (FOR RESURFACING OR PATCHING)

Polymer Modified Mortar (for resurfacing or patching) consists of a liquid binder, dry aggregate, cement, water and additives mixed together to make a workable mortar. The liquid binder must be a chemical and oil resistant, moisture insensitive, two-component polymer compound. Use material conforming to Sika Corporation SikaTop series, or equal.

Use dense product with high strength and high modulous. Produce consistency as required for the use.

Oven dry in sealed packages the aggregate until time of mixing, and use aggregate of size and consistency compatible with recommendations of manufacturer of liquid binder for intended application.

2.03 PRESSURE GROUTING EQUIPMENT

Use a mixer and holdover agitator tanks for pressure grouting equipment designed to place grout at pressures up to 50 psi. Provide gages to indicate pressure used. Provide mixer with a meter capable of indicating to one-tenth of a cubic foot the volume of grout used.

PART 3 - EXECUTION

3.01 GENERAL

Bonding compound for use with grout is specified in Section 03300. Apply primer, if required for polymer concrete, per manufacturer's recommendation.

3.02 DRYPACK GROUT

Use drypack grout for built-up surfaces, setting miscellaneous metal items and minor repairs.

For surfaces required to be built up with drypack grout, roughen by brushing, clean, and coat with the bonding compound specified in paragraph 03300-2.04 before the application of the grout. Apply drypack grout immediately following the application of the bonding compound in bands or strips to form a covering of the required thickness. The covering must be smooth. Slope construction joints in the grout. Clean and wet the construction joints before application is resumed.

Cure drypack grout in accordance with Section 03300.

Provide grout adequate protection during freezing weather.

3.03 CEMENT GROUT

Use cement grout for filling nonbearing portions of equipment pads and pressure grouting.

Except for the specialized equipment for pressure grouting, use mixing and placing apparatus similar to that normally used for cast-in-place concrete. Mix grout for a period of at least 1 minute. Agitate diluted grout to keep ingredients mixed.

3.04 NONSHRINK GROUT

Use nonshrink, nonmetallic aggregate grout for the bearing surfaces of machinery and equipment bases, column base plates and bearing plates. Use nonshrink metallic aggregate grout for setting anchor bolts and grouting reinforcing steel holes. Use grout meeting the requirements of CRD-C621. Place grout in accordance with manufacturer's instructions.

Blow clean holes required for grouting with compressed air and leave free of dust or standing water. Drill horizontal holes for grouting at a slight downward angle to facilitate holding the grout until setting is complete. Bolts or reinforcing steel installed in horizontal grout holes may accordingly be bent slightly.

END OF SECTION

GEOTECHNICAL EXPLORATION REPORT
FOR KAHIKINUI DRIVEWAY IMPROVEMENTS PROJECT PHASE 1
KAHIKINUI, MAUI, HAWAII

For:

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By:

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November 15, 2019 PSC Job No. 218306.10

GEOTECHNICAL EXPLORATION REPORT
FOR KAHIKINUI DRIVEWAY IMPROVEMENTS PROJECT PHASE 1
KAHIKINUI, MAUI, HAWAII

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PSC CONSULTANTS, LLC

GEOTECHNICAL EXPLORATION REPORT
FOR KAHIKINUI DRIVEWAY IMPROVEMENTS PROJECT PHASE 1
KAHIKINUI, MAUI, HAWAII

November 15, 2019 PSC Job No. 218306.10

INTRODUCTION

This report presents the results of our Geotechnical investigation for the Kahikinui Driveway Improvements Project Phase 1 in Kahikinui, Maui, Hawaii. The project site is shown on the Project Location and Vicinity Map, Plate 1. Our work was performed in accordance with the scope of work outlined in our proposals dated December 12, 2018 & July 8, 2019.

The purpose of the Kahikinui Driveway Improvement Project is to improve the driveway located in Kahikinui, Maui, Hawaii. The driveway currently consists of sections of paved concrete, gravel and grassy vegetation. Approximately 10,000 feet of driveway is planned to be improved. Paving operations are planned to consist of cast-in-place concrete with reinforcement. Concrete fords and culverts over the four major gulch crossings are planned to be constructed to control and divert rainwater. There will be four 48" culverts, three of which will include a ford crossing and one 60" culvert. The driveway is located on undeveloped land therefore no traffic control or permits are required.

On April 17, 2019, PSC performed geotechnical field borings. Due to the unforeseen conditions, PSC completed 8 of the proposed 21 borings in 8 days. Complications during our field investigations included:

- Difficult site accessibility, machinery was getting damaged, result was multiple flat tires and drill rig malfunctions.
- No water supply access within 40 min of the site.
- Complications with the residents during high traffic times.

In lieu of borings due to accessibility issues, PSC continued to hand auger the remaining 13 boring locations that were not accessible via drill rig. The hand augers were shallow in depth about 12"-15", and we were not able to perform exploration to our proposed depths. Thus, we propose to account for the accessibility issues using a tract mounted excavator to perform test pits to log the soil strata to a depth up to 10'.

On June 21, 2019, PSC was informed that the Kahikinui Driveway Improvements project will be split up into Phases. Phase one consists of a 2,300-foot section of concrete driveway located between lots 2 and 93. Our B-2 and B-3 hand augers are located within the phase one area.

To supplement our hand auger results the phase one supplemental geotechnical exploration will consist of conducting 3 tests pits at the B-2 and B-3 hand auger locations as well as an additional test pit approximately 500 feet up the existing driveway from the B-3 location. (See Plate No.2) The proposed test pits will be dug using an excavator. DCPT results and bulk samples will be collected at each test pit location at selected depths.

This report summarizes the findings from our field exploration and laboratory testing and presents our geotechnical engineering recommendations for feasibility planning derived from our analysis for the proposed Kahikinui Project Area Phase 1. These recommendations are intended for planning and design input only.

Austin, Tsutsumi & Associates, Inc. is the planner for this project and the clients include the Department of Hawaiian Homelands (DHHL).

PURPOSE AND SCOPE

Our Geotechnical Report for the proposed project provides a general overview of the subsurface conditions at the Kahikinui Project Phase 1 Area site. The subsurface information obtained will be used for the development of geotechnical recommendations for the site improvements including roads, and ford/ culvert crossing designs.

Our work was done in general accordance with our proposal dated July 8, 2019. The scope of work included the following:

1. Coordinate and schedule the soil investigation.

2. Dig 3 test pits to depths of up to 10 feet below the existing ground surface or until refusal.

3. Provide a field engineer to monitor the Test Pit & DCP operations, obtain soil samples at selected depth intervals, and maintain a log of the soils encountered within each boring.

4. Perform laboratory tests on selected samples to determine the relevant engineering properties of the near surface soils.

5. Analyze the field and laboratory data.

6. Provide a written report summarizing our findings and recommendations.

FIELD EXPLORATION

Our field exploration program consisted of digging and sampling 3 test pit at the proposed Kahikinui project phase 1 area to supplement boring exploration performed on October 1-4, 2019. Test Pits were dug up to 5 feet below the existing ground surface due to refusal. The locations of the borings drilled, and test pits are shown on Plate 5-10. Test Pit locations considered vehicular traffic, existing roadways, buried lines, and accessibility of drilling rigs and trucks.

The test pits were performed by our earthwork contractor using a excavator.

Our field engineer classified the soils in the field by visual/manual methods. Soils are classified in accordance with the Unified Soil Classifications System shown on Plate 3. Graphic presentations of the materials encountered are presented on the Log of Test Pits.

SITE DESCRIPTION

The project site Kahikinui is generally located the southern portion of Maui Island. The site is located on the Piiilani Highway between Keokea and Kaupo. The site consists of 23,000 acres from mauka to makai. The project site is DHHL owned land neighboring the Kaupo region and Haleakala National Park. The Ka Ohana O Kahikinui is a small group of about 15 families that live entirely off-grid. As a community, their purpose is to develop, implement and maintain a community based land and natural; resource management programs, document and register all historic and archeological sites , restore and maintain historical and archeological sites to develop self-sufficiency through subsistence homesteading.

The project area is located on the southern leeward slopes of Haleakalā approximately 2.6 km (1.64 mi) upslope (north) of Pi‘ilani Highway (Route 31). The project area is on moderately sloping ground approximately 4.75 km (2.95 mi) north of the shoreline, 7.74 km (4.81 mi) southwest of Haleakalā Crater, and 3.39 km (2.44 mi) northeast of Luala‘ilua Hills. The project area is depicted on a portion of the 1995 Lualailua U.S. Geological Survey 7.5-minute topographic quadrangle.

The project area is located on the steep portion of the southern leeward slope of Haleakalā approximately 4.75 km (2.95 mi) northwest of the shoreline, 7.74 km (4.81 mi) southwest of Haleakalā Crater, and 3.93 km (2.44 mi) northeast of Luala‘ilua Hills. The elevation of land within the project area ranges from 823 to 1280 m (2,700 to 4,200 ft) above mean sea level (amsl).

The building environment of the project area includes the driveway that extends from Pi‘ilani Highway (Route 31) northward to provide access to the individual homestead lots and community buildings on the property. Observed driveway surfaces include poured concrete, concrete paving strips, dirt, and gravel. In some areas, overgrown alignments of former ranch roads are visible. Residents of the area also informed CSH that subsurface utility lines (electric, phone, internet) are buried in the driveway corridor. The Auwahi Wind turbines are located 4.9 km (3.1 mi) southeast of the westernmost extent of the project area. The project area is also located approximately 7.8km (4.82 mi) south by southeast of the Observatory located on the summit of Haleakalā at Red Hill.

At the time of our field exploration, the project site was generally covered by moderate to heavy vegetation, grass and brush.

SUBSURFACE CONDITIONS

Our Test Pits at the DHHL Kahikinui Project Area generally encountered colluvial soils consisting of loose to medium dense silty sand or silty gravel extending down to the maximum depth explored of about 22.5 feet below the existing ground surface. Boring No. 2A was drilled in a grass area and encountered brown silty gravel with some sand and cinder down to a depth of 22.5 feet which was done previously in April 2019. Test Pit 2, 3A and 3B was dug in grassy areas with reddish brown silty sand (volcanic ash/cinder) with loose basaltic gravel dug to refusal around 2.5-5.0 feet.

We did not encounter groundwater in the test pits at the time of our field exploration. However, it should be noted that groundwater levels are subject to change due to rainfall, time of year, seasonal precipitation, surface water runoff, and other factors.

LABORATORY TESTING

Moisture Content

Moisture Content (ASTM D2216) determinations were performed on selected samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings at the appropriate sample depths.

Sieve Analysis

Sieve analyses (ASTM) Test Method D442) were performed on selected samples to evaluate the gradation characteristics of the soil and to aid in soil classification. The Sieve Analysis test results for are presented on Plates 11.

Moisture Density

Moisture Density (ASTM D1557) results are presented on Plates 12.

California Bearing Ratio

California Bearing Ratio (CBR) test (ASTM D1883) was performed on a selected bulk sample of the near-surface soils to evaluate the pavement support characteristics of the on-site soils. Results of our laboratory CBR tests are used pavement and foundation recommendations. The CBR test results for are presented on Plates 13.

Direct Shear Test

Direct Shear tests (ASTM D3080) were performed on selected samples to determine shear strength properties. The test results are provided on Plates 14.

DISCUSSION AND RECOMMENDATIONS

Site Preparation

At the onset of earthwork, the area within the contract grading limits should be cleared of trees, vegetation, debris, rubbish, boulders and other deleterious materials. These materials should be removed and properly disposed of offsite.

Areas to receive fill should be scarified to a depth of about 8 inches, moisture-conditioned to at least 2 percent above the optimum moisture content and compacted to a minimum of 90 percent relative compaction. Relative compaction refers to the in-place, dry density of soil expressed as percentage of the maximum dry density of the same soil established in accordance with ASTM Test designation D 1557. The optimum moisture content is the moisture content corresponding to the maximum compacted dry density.

Soft or yielding areas encountered during site preparation should be over-excavated to expose firm soil surface and stabilized by backfilling with select material placed in 8-inch thick, loose lifts and compacted to a minimum of 90 percent relative compaction. It is important that the scarification and recompaction operations be performed in the presence of a representative of PSC Consultants, LLC (PSC).

Fills and Backfills

In general, the excavated on-site soils should be suitable for use as general fill materials, provided that they are free of vegetation, deleterious materials, and rock fragments greater than 3 inches in largest dimension. It should be noted that the project site is located in a high rainfall environment throughout the year; therefore, the in-situ soils will constantly be in a very moist to wet condition and drying or aerating the excavated materials may be necessary prior to their use as general fill.

Imported fill materials should consist of select granular fill material, such as crushed basalt or coral. The select granular fill should be well-graded from coarse to fine with particles no larger than 3 inches in largest dimension and should contain between 10 and 30 percent particles passing the No. 200 sieve. The material should have a laboratory CBR value of 20 or more and should have a maximum swell of less than 1 percent when tested in accordance with ASTM D1883.

Aggregate base materials should consist of crushed basaltic aggregates and should conform to Section 31 of the City and County of Honolulu, Department of Public Works, "Standard Specifications for Public Works Construction," dated September 1986. Imported fill materials should be tested for conformance with these recommendations prior to delivery to the project site for the intended use.

Fill Placement and Compaction Requirements

General fill materials should be placed in level lifts not exceeding 8 inches in loose thickness, moisture-conditioned to at least 2 percent above the optimum moisture content and compacted to at least 90 percent relative compaction. Select granular fill materials should be placed in level lifts of about 8 inches in loose thickness, moisture-conditioned to above the optimum moisture, and compacted to at least 90 percent relative compaction.

Aggregate base and subbase course materials should be moisture conditioned to above the optimum moisture content, placed in level lifts not exceeding 8 inches in loose thickness, and compacted to a minimum of 95 percent relative compaction.

Relative compaction refers to the in-place, dry density of soil expressed as percentage of the maximum dry density of the same soil established in accordance with ASTM Test designation D 1557. The optimum moisture content is the moisture content corresponding to the maximum compacted dry density.

Compaction should be accomplished by sheepsfoot rollers, vibratory rollers, or other types of acceptable compaction equipment. Water tamping, jetting, or ponding should not be allowed to compact the fills. Where compaction is less than required, additional compactive effort should be

applied with adjustment of moisture content as necessary, to obtain the specified compaction. It should be noted that excessive vibrations from compaction equipment may soften the on-site soils with high in-situ moisture contents; therefore, vibrations should be carefully controlled during compaction efforts.

Excavations

Based on the anticipated grading and our field exploration, excavation for this project will generally consist of excavations for pavement structure, foundations, and infrastructure installation. Some of the excavations may encounter boulders and clusters of cobbles within the alluvial soils. It is anticipated that most of the materials may be excavated with normal heavy excavation equipment. However, deep excavations and boulder excavations may require the use of hoe rams.

The above discussions regarding the rippability of the subsurface materials are based on field data from the borings drilled at the site. Contractors should be encouraged to examine the site conditions and the subsurface data to make their own reasonable and prudent interpretation.

Pavements

Based on the results of our field exploration, we anticipate the pavement subgrades along the existing roadway alignments are generally underlain by soft to medium stiff silty clay/clayey silt with varying amounts of sand and gravel underlain by basaltic rock formation. Results of our laboratory CBR tests indicate that the samples of on-site soils tested had low CBR values ranging from about 5 to 7 with moderate to high expansive potential, indicating the on-site soils tested exhibit poor pavement characteristics.

Based on the "Structural Design Requirements for New Asphalt Concrete Pavements" issued under the Engineering and Policy Memorandum No. CEB-1-06 by the City and County of Honolulu, pavements that are anticipated to support relatively few loads (less than 1 million equivalent single axle load, ESALs) over their design life and contain no regular bus routes are generally considered Low-Volume Pavements. Conversely, pavements that do not meet the low-volume criteria in the memorandum are generally considered "high-volume" pavements supporting an appreciable amount of loading. We anticipate the pavements for the proposed area may generally be considered Low-Volume Pavements.

Based on the assumptions discussed above, the following pavement sections may be used for the preliminary design of pavements for the proposed area at the project site: We recommend using the following new pavement structural sections for preliminary design purposes:

Rigid Pavement for the Proposed Area
6.0-Inches Portland Cement Concrete
12.0-Inches Aggregate Subbase Course (95 Percent Relative Compaction) with one layer of Reinforcing Geogrid (such as Tensar TriAx Grid TX7 or equivalent) placed in the middle

18.0-Inches Total Pavement Thickness over moist subgrade compacted to a minimum of 95 percent relative compaction

Utility Trenches

Granular bedding consisting of 6 inches of No. 3B Fine gravel is recommended under the pipes. Free draining granular materials, such as No. 3B fine gravel (ASTM C 33, No. 67 gradation) should also be used for the trench backfill above and at sides of the pipes to provide support around the pipes and to reducing the potential for damaging the pipes.

CONCLUSIONS

Silty Sands (Volcanic Ash/Cinder) underlined with a basaltic formation with relatively high in-situ moisture contents will be a likely soil profile for the Phase 1 portion of the DHHL Kahikinui Driveway Improvement project. The on-site soils exhibit high shrink/swell potential and relatively poor pavement support characteristics. Conventional earthwork and construction methods may be used for the proposed project grading.

In general, the excavated on-site soils should be suitable for use as general fill materials, provided that they are free of vegetation, deleterious materials, and rock fragments greater than 3 inches in largest dimension. It should be noted that the project site is located in a high rainfall environment throughout the year; therefore, the in-situ soils will constantly be in a very moist to wet condition and drying or aerating the excavated materials may be necessary prior to their use as general fill.

The information and recommendations presented in this report have been based upon the existing materials encountered at the site, and during construction PSC Consultants, LLC (PSC) should be notified in the event that soil conditions change so we can modify or amend our recommendations as necessary.

LIMITATIONS

The analysis and recommendations submitted in this report are based, in part, upon information obtained from two test borings and laboratory tests. Variations of subsoil conditions may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to reevaluate the recommendation provided in this report.

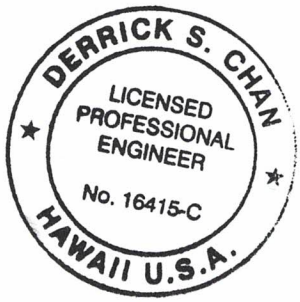
PSC Consultants LLC selected the boring/test pit locations in this report. The boring/test pit locations were located by taping from existing features and structures shown on the plans. The physical locations and elevations of the test boring should be considered accurate only to the degree implied by the methods used.

This report has been prepared for the exclusive use of Austin, Tsutsumi and Associates and their consultants for specific application to this project in accordance with generally accepted geotechnical engineering principles and practices. It may not contain sufficient data or proper information to serve the structural/civil engineer for their design work or a contractor wishing to bid on this project. No warranty is expressed or implied.

The owner/client should be aware that unanticipated soil/rock and cavity/soft spot conditions are commonly encountered. Unforeseen soil/rock conditions, hard layers, soft deposits, and cavities may occur in localized areas and may require probing or corrections in the field (which may result in construction delays) to attain a properly constructed project.

The findings in this report are valid as of the present date. However, changes in the soil conditions, either natural or manmade, can occur with the passage of time. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control. Therefore, this report is subject to review by the controlling agencies and is valid for a period of two years.

Respectfully submitted:
PSC CONSULTANTS, LLC



Derrick S. Chan, P.E.
President

This work was prepared by
me or under my supervision
(License Expires April 30, 2020)

Encl.:

Plate 1	Project and Vicinity Map
Plate 2	Boring Location Map
Plate 3	Unified Soil Classification System
Plate 4	Log of Boring B-2A
Plate 5	Log of Test Pit B-2
Plate 6	Log of Test Pit B-3A
Plate 7	Log of Test Pit B-3B
Plate 8	Log of DCP B-2
Plate 9	Log of DCP B-3A
Plate 10	Log of DCP B-3B
Plate 11	Sieve Analysis Test Results
Plate 12	Proctor Test Results
Plate 13	California Bearing Ratio Test Results
Plate 14	Direct Shear Test Results

Reference: XXXX
NOT TO SCALE

Project Location and Vicinity Map

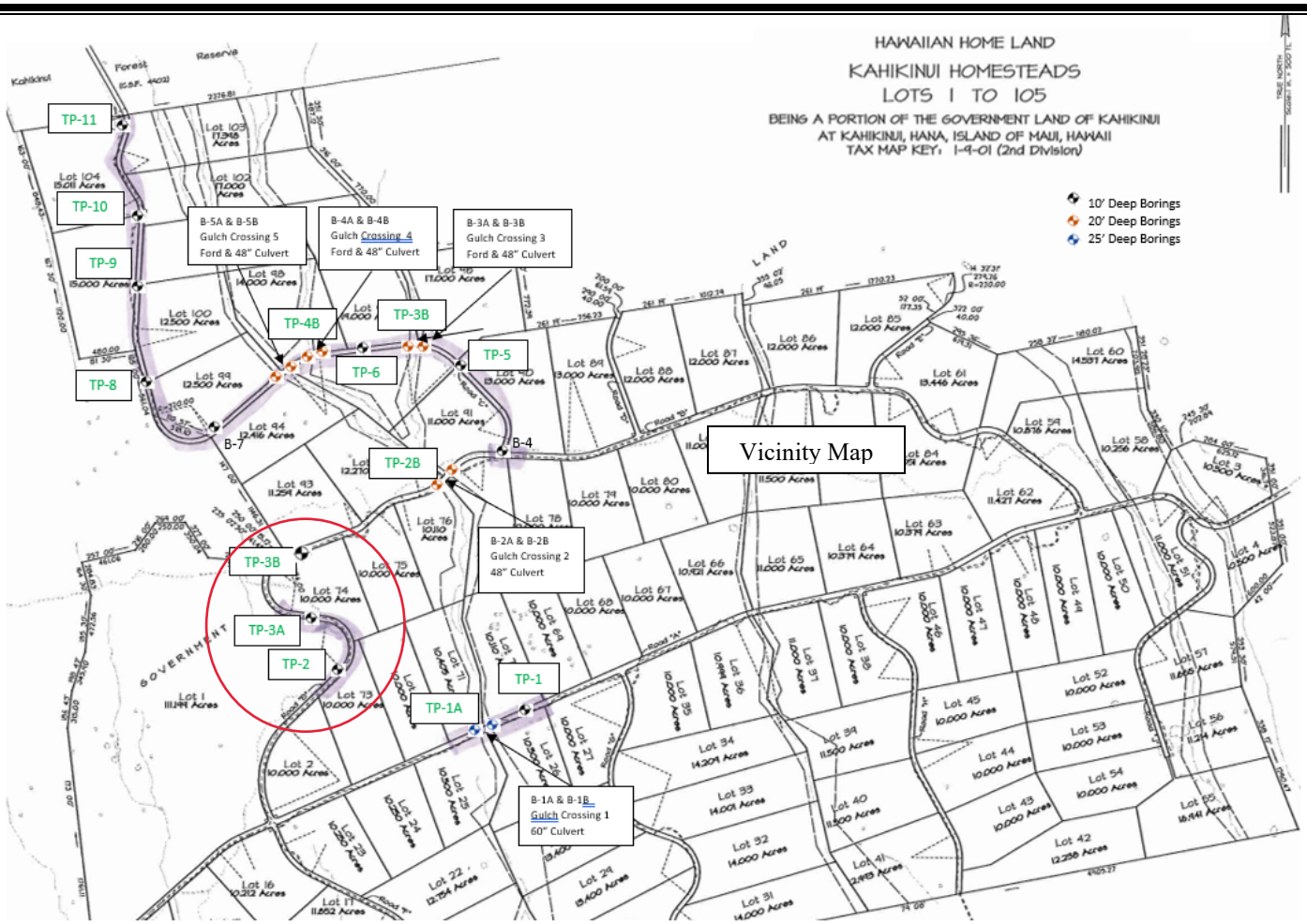
PSC CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019

PROJECT NO. 218306.10

PLATE NO. 1



Reference: XXXX
NOT TO SCALE

Test Pit Location Map

PSC CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

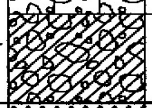
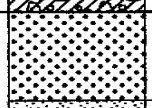
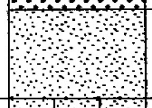
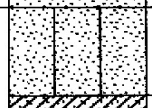
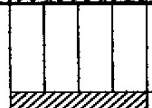
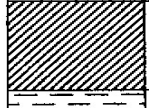
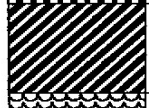
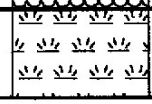
Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019

PROJECT NO. 218306.10

PLATE NO. 2

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS 50% OR MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS 50 % OR MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN OR EQUAL TO 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

Unified Soils Classification System

PSC CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019 | PROJECT NO. 218306.10

PLATE NO. 3

BORING LOCATION: Kahikinui	DRILLER: Valley Well	**BORING NO. B-2A**
BORING ELEVATION (ft): N/A	LOGGED BY: SJ	
DATE (S) DRILLED: 4/24/2019	TYPE RIG: Mobile B-40	

OTHER LAB TESTS	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	CORE RECOVERY (%)	R.Q.D. (%)	NUMBER OF BLOWS/12"	SAMPLER TYPE & NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	U.S.C.S.	GEOTECHNICAL DESCRIPTION
							0		GM	Brown Silty Gravel (Balsaltic) with some sand (cinder), loose to medium dense (fill)
			100		5	MC B-2A (Tube 1)				
			27.8		20	MC B-2A (Tube 2)	5			Same as above, (colluvium)
			33.3		17	MC B-2A (Tube 3)	10			Same as above
			55.6		20	MC B-2A (Tube 4)	15		GM	Brown Silty Gravel, Moist, Medium Dense, Highly Weathered
									GM	
			44.4		8	MC B-2A (Tube 5)	20		GM	Same as above
							25			

SAMPLE TYPE

D&M - Dames & Moore	SPT - Standard Penetration
CB - Core Barrel	SH - Shelby Tube
AUG - Auger Cuttings	NR - No Recovery

OTHER LABORATORY TESTS

MD - Moisture/Density	UC - Unconfined Compression
CON - Consolidation Test	SG - Specific Gravity
PI - Atterberg Limits	SA - Sieve Analysis

LOG OF BORING

CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/19 | PROJECT NO.: 218306.10

PLATE NO. 4

BORING 6 KAHIKINUI DRIVEWAY IMPROVEMEMTS.GPJ TEST PIT.GDT 5/3/19

BORING LOCATION:	DRILLER: Ronald	**BORING NO. TP-2**
BORING ELEVATION (ft): 2990	LOGGED BY: JE	
DATE (S) DRILLED: 10/02/19	TYPE RIG: Excavator	

OTHER LAB TESTS	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	CORE RECOVERY (%)	R.Q.D. (%)	NUMBER OF BLOWS/12"	SAMPLER TYPE & NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	U.S.C.S.	GEOTECHNICAL DESCRIPTION
									SM	Reddish-Brown Silty Sand (Volcanic Ash/Cinder) with basaltic gravel, very loose, moist
CBR, Proctor	57	38.9				DISTURBED SAMPLE				
										2988.4 Grayish Basalt, highly fracture, hard
										Refusal at about 1.6 feet
							5			
							10			

SAMPLE TYPE

D&M - Dames & Moore	SPT - Standard Penetration
CB - Core Barrel	SH - Shelby Tube
AUG - Auger Cuttings	NR - No Recovery

OTHER LABORATORY TESTS

MD - Moisture/Density	UC - Unconfined Compression
CON - Consolidation Test	SG - Specific Gravity
PI - Atterberg Limits	SA - Sieve Analysis

LOG OF BORING

CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019 | PROJECT NO.: 218306.10

PLATE NO. 5

BORING 6 DHHL.GPJ PSCSTANDARD.GDT 10/29/19

BORING LOCATION:	DRILLER: Ronald	**BORING NO. TP-3A**
BORING ELEVATION (ft): 3120	LOGGED BY: JE	
DATE (S) DRILLED: 10/01/19	TYPE RIG: Excavator	

OTHER LAB TESTS	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	CORE RECOVERY (%)	R.Q.D. (%)	NUMBER OF BLOWS/12"	SAMPLER TYPE & NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	U.S.C.S.	GEOTECHNICAL DESCRIPTION
						DISTURBED SAMPLE			SM	Dark Brown Silty Sand (Volcanic Ash/Cinder) with basaltic gravel, moist, loose
CBR, Proctor	57	61.2								
										3117.3
										Grayish Basalt, Highly fractured, hard
										Refusal at about 2.7 feet
							5			
							10			

SAMPLE TYPE

D&M - Dames & Moore	SPT - Standard Penetration
CB - Core Barrel	SH - Shelby Tube
AUG - Auger Cuttings	NR - No Recovery

OTHER LABORATORY TESTS

MD - Moisture/Density	UC - Unconfined Compression
CON - Consolidation Test	SG - Specific Gravity
PI - Atterberg Limits	SA - Sieve Analysis

LOG OF BORING

PSC CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019 | PROJECT NO.: 218306.10

PLATE NO. 6

BORING 6 DHHL.GPJ PSCSTANDARD.GDT 10/29/19

BORING LOCATION:	DRILLER: Ronald	**BORING NO. TP-3B**
BORING ELEVATION (ft): 3220	LOGGED BY: JE	
DATE (S) DRILLED: 10/01/19	TYPE RIG: Excavator	

OTHER LAB TESTS	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	CORE RECOVERY (%)	R.Q.D. (%)	NUMBER OF BLOWS/12"	SAMPLER TYPE & NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	U.S.C.S.	GEOTECHNICAL DESCRIPTION
							0		SM	Dark Brown Silty Sand (Volcanic Ash/Cinder) very loose, moist
										3219.0
						DISTURBED SAMPLE			GM	Reddish-Brown Silty Sand (Volcanic Ash/Cinder) with basaltic gravel, very loose, moist
CBR, Proctor	57	60.5								3217.5
										Grayish Basalt, Highly fractured, hard,
										Refusal at about 2.5 feet
							5			
							10			

SAMPLE TYPE

D&M - Dames & Moore	SPT - Standard Penetration
CB - Core Barrel	SH - Shelby Tube
AUG - Auger Cuttings	NR - No Recovery

OTHER LABORATORY TESTS

MD - Moisture/Density	UC - Unconfined Compression
CON - Consolidation Test	SG - Specific Gravity
PI - Atterberg Limits	SA - Sieve Analysis

LOG OF BORING

CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019 | PROJECT NO.: 218306.10

PLATE NO. 7

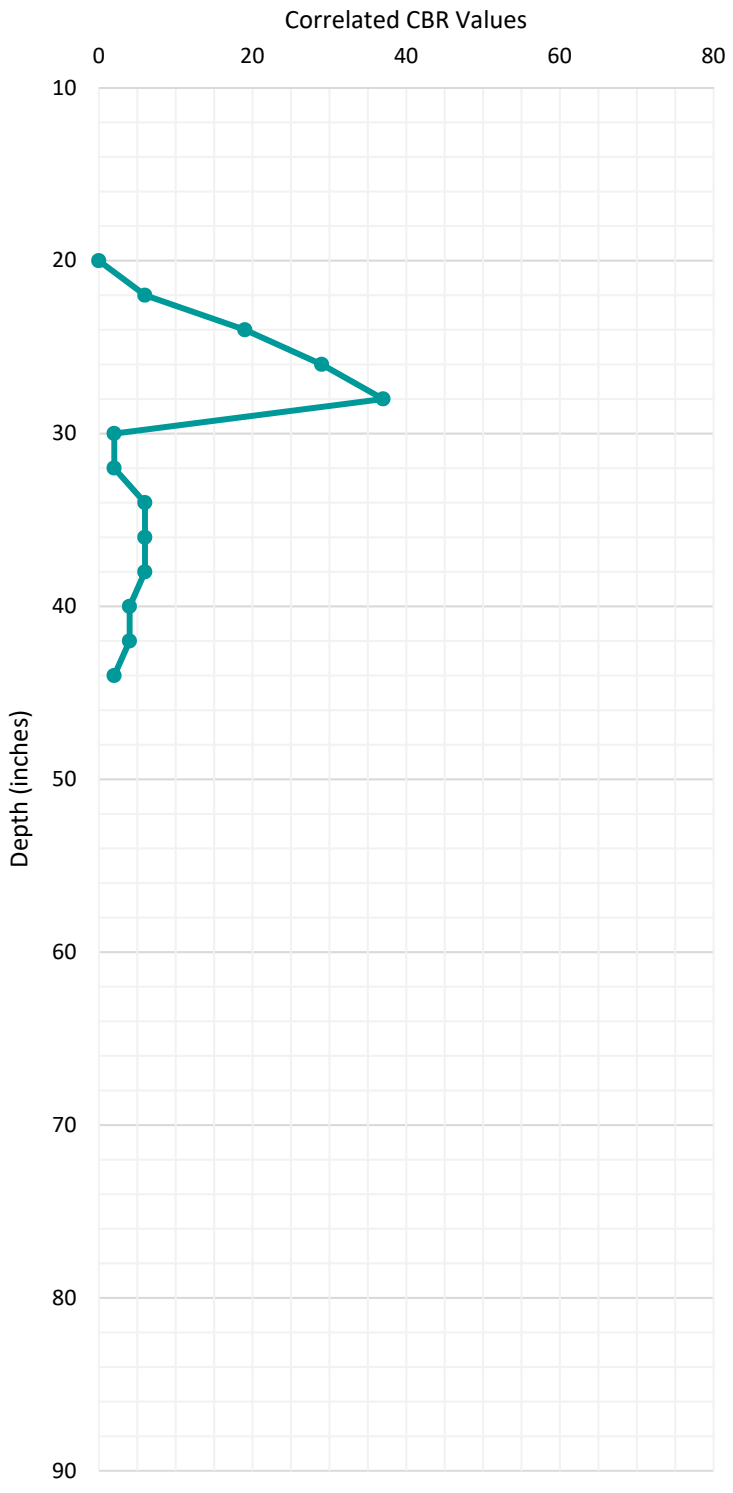
BORING 6 DHHL.GPJ PSCSTANDARD.GDT 10/29/19

Kokua Geotech LLC
Soil and Foundation Engineering

DHHL Kahikinui Driveway
Improvement Project, Kahikinui, Maui, HI

LOG OF DCP **2**

No. of Blows	Depth of Penetration	Correlated CBR Value	Correlated SPT Blow Count
	(inches)		(blow/foot)
0	20	0.0	0
3	22	6.0	13
9	24	19.0	30
13	26	29.0	39
16	28	37.0	46
1	30	2.0	6
1	32	2.0	6
3	34	6.0	13
3	36	6.0	13
3	38	6.0	13
2	40	4.0	10
2	42	4.0	10
1	44	2.0	6

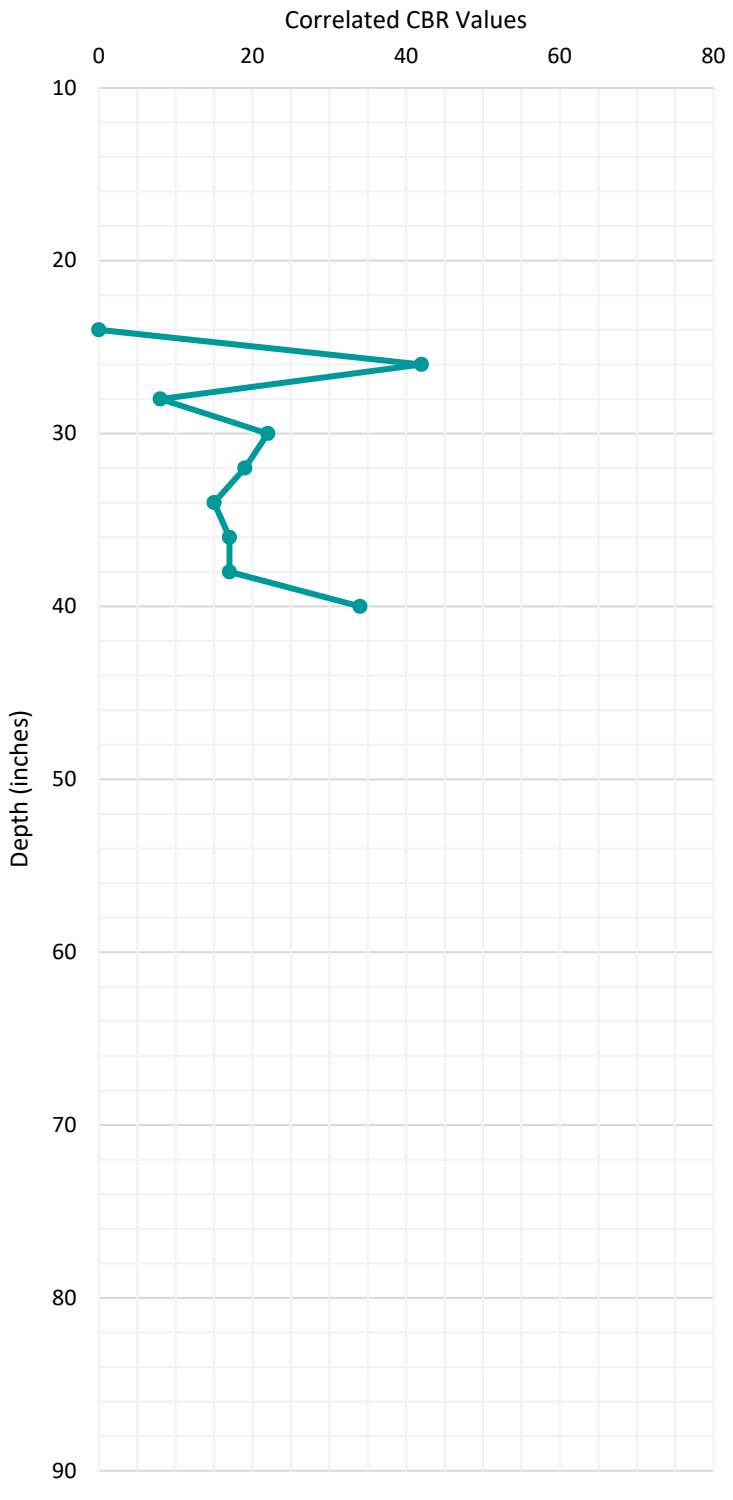


Project No.:	112918-00	Total Depth:	2.0 to 4.0 feet
Date Started:	10/1/2019	Probing Equipment:	DCP H-4220F
Date Completed:	10/2/2019	Size of Cone Tip:	0.790-inch diameter with 60° cone
Logged By:	JJP	Driving Energy:	10.1 lb. steel mass falling 22.6 inches

PLATE C.1

Kokua Geotech LLC Soil and Foundation Engineering	DHHL Kahikinui Driveway Improvement Project, Kahikinui, Maui, HI	LOG OF DCP **3A**

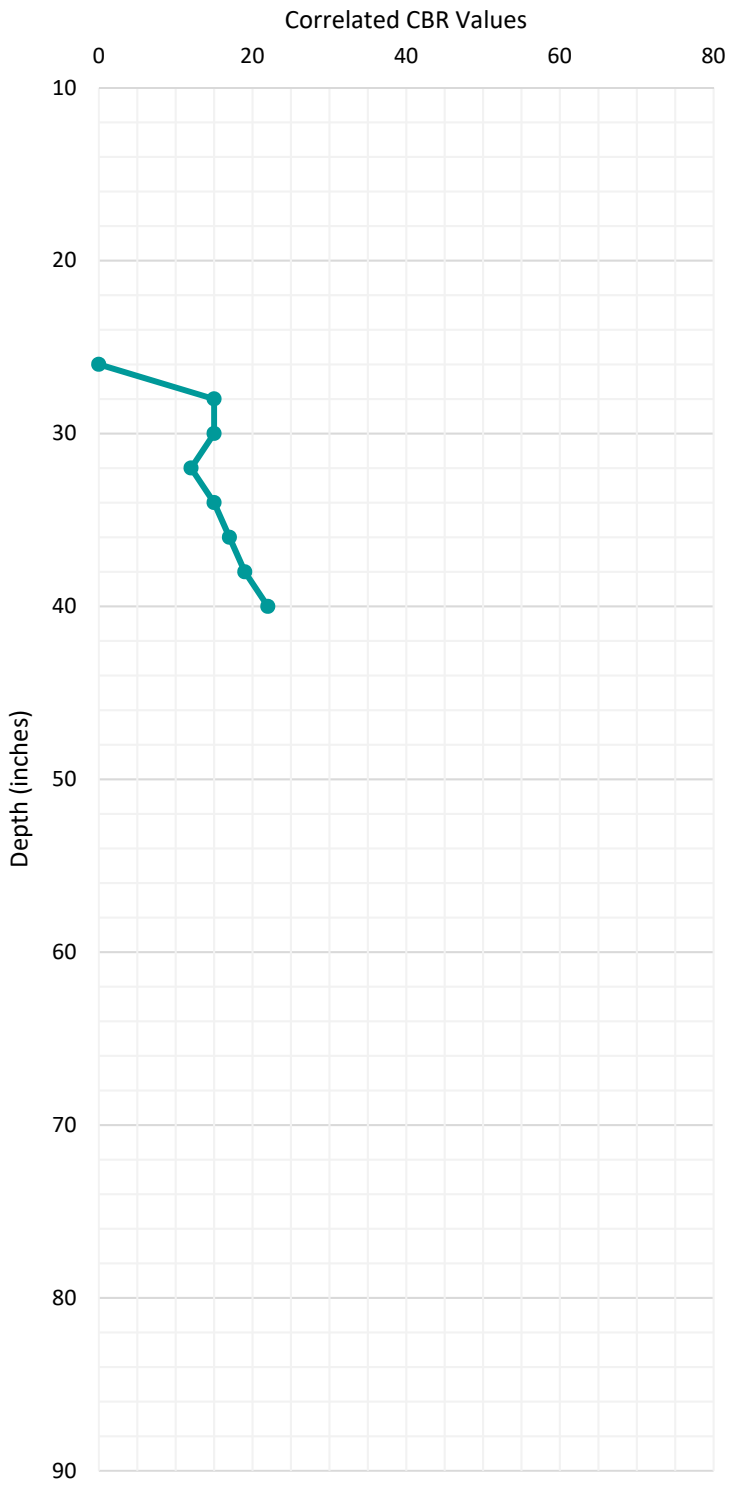
No. of Blows	Depth of Penetration	Correlated CBR Value	Correlated SPT Blow Count
	(inches)		(blow/foot)
0	24	0.0	0
18	26	42.0	50
4	28	8.0	16
10	30	22.0	32
9	32	19.0	30
7	34	15.0	25
8	36	17.0	27
8	38	17.0	27
15	40	34.0	44
20/1"	(Refusal)		



Project No.:	112918-00	Total Depth:	2.0 to 3.4 feet	**PLATE**
Date Started:	10/1/2019	Probing Equipment:	DCP H-4220F	
Date Completed:	10/2/2019	Size of Cone Tip:	0.790-inch diameter with 60° cone	**C.2**
Logged By:	JJP	Driving Energy:	10.1 lb. steel mass falling 22.6 inches	

Kokua Geotech LLC Soil and Foundation Engineering	DHHL Kahikinui Driveway Improvement Project, Kahikinui, Maui, HI	LOG OF DCP **3B**

No. of Blows	Depth of Penetration	Correlated CBR Value	Correlated SPT Blow Count
	(inches)		(blow/foot)
0	26	0.0	0
7	28	15.0	25
7	30	15.0	25
6	32	12.0	22
7	34	15.0	25
8	36	17.0	27
9	38	19.0	30
10	40	22.0	32
22/1"	(Refusal)		



Project No.:	112918-00	Total Depth:	2.0 to 3.4 feet	**PLATE**
Date Started:	10/1/2019	Probing Equipment:	DCP H-4220F	
Date Completed:	10/2/2019	Size of Cone Tip:	0.790-inch diameter with 60° cone	**C.3**
Logged By:	JJP	Driving Energy:	10.1 lb. steel mass falling 22.6 inches	

SIEVE ANALYSIS (ASTM D422-63 Re- Approved 2002)

Project	DHHL Kahikunui Driveway	Job No.	218306.1
Sample Source	Native- Test Pit TP-2	Boring No.	677
Soil Description	Brown silty sand with gravels	Sample No.	TP-2
Tested by	LH	Test Date(s)	10/31/2019

Wt of wet sample & tare		**-200 Wash**	
Wt of dry sample and tare	764.6	**Before Wash**	
Moisture Loss	-764.6	Wt of dry sample and tare	764.6
Wt of tare	249.9	**After Wash**	
Wt of dry sample	514.7	Wt of dry sample and tare	594.6
Moisture content	-148.6%	Wt. Passing -200	170
		% Passing -200	33.0%

Sieve no.	Diameter (mm)	Cumulative Weight Retained (gm)	% Retained	% Passing
3/8"	9.5	42.00	8.16%	91.84%
#4	4.75	88.00	17.10%	82.90%
#8	2.36	115.00	22.34%	77.66%
#16	1.18	158.00	30.70%	69.30%
#30	0.6	186.00	36.14%	63.86%
#50	0.3	218.00	42.35%	57.65%
#100	0.15	270.00	52.46%	47.54%
#200	0.075	340.00	66.06%	33.94%
Pan		354.00	68.80%	31.20%

Fine Aggregates Sieving

SIEVE ANALYSIS (ASTM D422-63 Re- Approved 2002)

Project	DHHL Kahikunui Driveway	Job No.	218306.1
Sample Source	Native- Test Pit TP-3A	Boring No.	TP-3A
Soil Description	Brown silty sand with gravels	Sample No.	678
Tested by	LH	Test Date(s)	10/31/2019

Wt of wet sample & tare		**-200 Wash**	
Wt of dry sample and tare	716.8	**Before Wash**	
Moisture Loss	-716.8	Wt of dry sample and tare	716.8
Wt of tare	203.1	**After Wash**	
Wt of dry sample	513.7	Wt of dry sample and tare	599.5
Moisture content	-139.5%	Wt. Passing -200	117.3
		% Passing -200	22.8%

Sieve no.	Diameter (mm)	Cumulative Weight Retained (gm)	% Retained	% Passing
#4	4.75	99.00	19.27%	80.73%
#8	2.36	136.00	26.47%	73.53%
#16	1.18	177.00	34.46%	65.54%
#30	0.6	210.00	40.88%	59.12%
#50	0.3	248.00	48.28%	51.72%
#100	0.15	309.00	60.15%	39.85%
#200	0.075	387.00	75.34%	24.66%
Pan		404.00	78.60%	21.40%

Fine Aggregates Sieving

PLATE NO. 11

SIEVE ANALYSIS (ASTM D422-63 Re- Approved 2002)

Project	DHHL Kahikunui Driveway	Job No.	218306.1
Sample Source	Native- Test Pit TP-3B	Boring No.	TP-3B
Soil Description	Brown silty sand with gravels	Sample No.	679
Tested by	LH	Test Date(s)	10/31/2019

Wt of wet sample & tare		**-200 Wash**	
Wt of dry sample and tare	686.3	**Before Wash**	
Moisture Loss	-686.3	Wt of dry sample and tare	686.6
Wt of tare	170.7	**After Wash**	
Wt of dry sample	515.6	Wt of dry sample and tare	566.1
Moisture content	-133.1%	Wt. Passing -200	120.5
		% Passing -200	23.4%

Sieve no.	Diameter (mm)	Cumulative Weight Retained (gm)	% Retained	% Passing
#4	4.75	110.00	21.33%	78.67%
#8	2.36	139.00	26.96%	73.04%
#16	1.18	189.00	36.66%	63.34%
#30	0.6	225.00	43.64%	56.36%
#50	0.3	262.00	50.81%	49.19%
#100	0.15	316.00	61.29%	38.71%
#200	0.075	387.00	75.06%	24.94%
Pan		461.00	78.50%	1.50%

Fine Aggregates Sieving

SIEVE ANALYSIS (ASTM D422-63 Re- Approved 2002)

Project	DHHL Kahikunui Driveway	Job No.	218306.1
Sample Source	Native- Test Pit TP-2	Boring No.	TP-2
Soil Description	Coarse Gravels with Silt	Sample No.	677
Tested by	LH	Test Date(s)	10/28- 10/31

Wt of wet sample & tare	N/A	**-200 Wash**	
Wt of dry sample and tare	50122.3	**Before Wash**	
Moisture Loss	#VALUE!	Wt of dry sample and tare	50122.3
Wt of tare	0.0	**After Wash**	
Wt of dry sample	50122.3	Wt of dry sample and tare	50122.3
Moisture content	#VALUE!	Wt. Passing -200	0
		% Passing -200	0.0%

Sieve no.	Diameter (mm)	Cumulative Weight Retained (gm)	% Retained	% Passing
2-1/2"	63	1493.00	2.98%	97.02%
2"	50.8	2791.00	5.57%	94.43%
1-1/2"	37.5	5488.00	10.95%	89.05%
1"	25	9054.00	18.06%	81.94%
3/4"	19	10180.00	20.31%	79.69%
1/2"	12.7	10333.00	20.62%	79.38%
1/4"	6.3	10359.00	20.67%	79.33%

Coarse Aggregates Sieveing

PLATE NO. 11

SIEVE ANALYSIS (ASTM D422-63 Re- Approved 2002)

Project	DHHL Kahikunui Driveway	Job No.	218306.1
Sample Source	Native- Test Pit TP-3A/B	Boring No.	TP-3A/B
Soil Description	Coarse Gravels with Silt	Sample No.	678/679
Tested by	LH	Test Date(s)	10/28- 10/31

Wt of wet sample & tare	N/A	**-200 Wash**	
Wt of dry sample and tare	56550.9	**Before Wash**	
Moisture Loss	#VALUE!	Wt of dry sample and tare	56550.9
Wt of tare	0.0	**After Wash**	
Wt of dry sample	56550.9	Wt of dry sample and tare	56550.9
Moisture content	#VALUE!	Wt. Passing -200	0
		% Passing -200	0.0%

Sieve no.	Diameter (mm)	Cumulative Weight Retained (gm)	% Retained	% Passing
2-1/2"	63	1707.00	3.02%	96.98%
2"	50.8	4414.00	7.81%	92.19%
1-1/2"	37.5	6474.00	11.45%	88.55%
1"	25	9467.00	16.74%	83.26%
3/4"	19	10850.00	19.19%	80.81%
1/2"	12.7	11245.00	19.88%	80.12%
1/4"	6.3	11592.00	20.50%	79.50%

Coarse Aggregates Sieving

Moisture Density

ASTM D1557

Report #: MF0111-000001

PSC Consultants, LLC
94-547 Ukee Street
Suite 210
Waipahu, HI 96797
Phone: (808) 676-6677
Fax: (808) 676-7733

Client:
Austin, Tsutsumi & Associates
501 Summer Street
St. #521
Honolulu, HI 96817

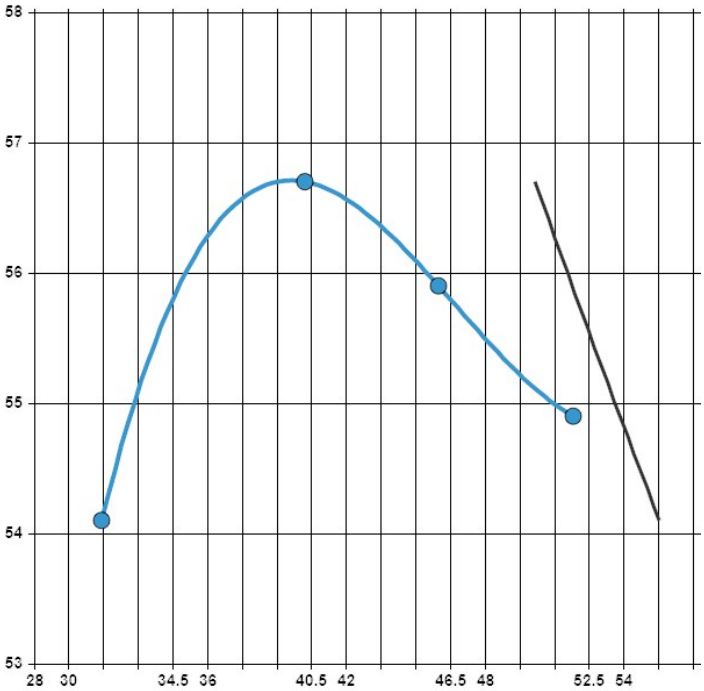
Project:
218306.10
Kahikinui Driveway Improvements
Maui, Rock Wall
Kula, HI 96790

Sample Information

Sample Number:	677	**Depth (ft):**	0' - 5' Below Existing grade
Boring Number:	TP-2	**Sample From:**	Test Pit
Sampling Method:	Bucket auger ASTM D6907	**Sampled By:**	Ekankang, Hegire
Location:	Kahikinui Driveway Improvements		
Location Details:	TP-2		
Sample Date:	10/07/2019		
Received Date:	10/18/2019	**Lab:**	94-547 Ukee Street #210, Waipahu, HI, 96797
Tested Date:	10/21/2019		

Laboratory Data

Sieve Size	Individual Retained (%)	Cumulative Retained (%)
Retained on 3/4 Sieve		
Retained on 3/8 Sieve		
Retained on #4 Sieve		
Passing #4 Sieve		



Method: A (ASTM D1557-12e1)
Preparation Method: Moist
Rammer Type: Manual Round
Specific Gravity: 1.65
Specific Gravity Source: Assumed
Maximum Dry Density (pcf): 56.7
Optimum Moisture (%): 38.9

Soil Classification: Brown Silty Clay

General

Moisture Density

ASTM D1557

Report #: MF0111-000004

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Waipahu, HI 96797
Phone: (808) 676-6677
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Client:
Austin, Tsutsumi & Associates
501 Summer Street
St. #521
Honolulu, HI 96817

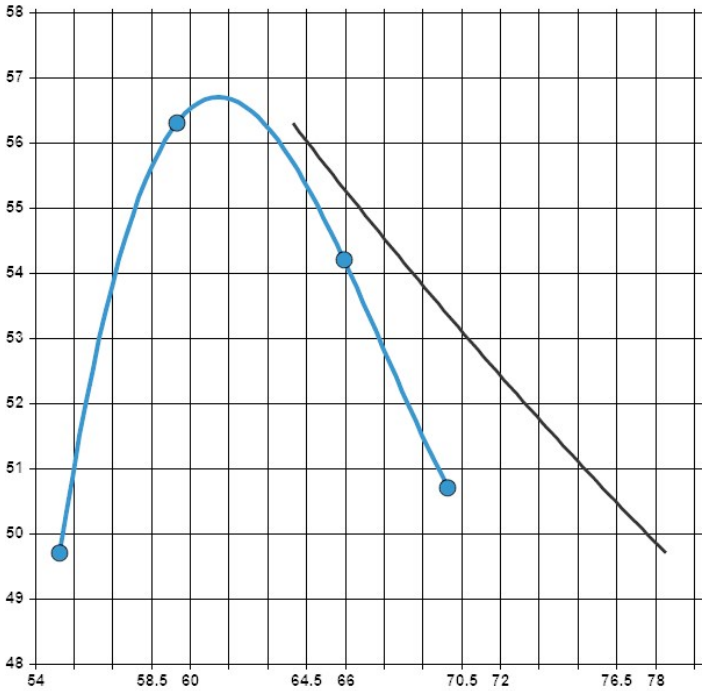
Project:
218306.10
Kahikinui Driveway Improvements
Maui, Rock Wall
Kula, HI 96790

Sample Information

Sample Number:	678	**Depth (ft):**	0' - 5' Below Existing Grade
Boring Number:	TP-3A	**Sample From:**	Test Pit
Sampling Method:	Bucket auger ASTM D6907	**Sampled By:**	Ekankang, Hegire
Location:	Kahikinui Driveway Improvements		
Location Details:	TP-3A		
Sample Date:	10/07/2019		
Received Date:	10/18/2019	**Lab:**	94-547 Ukee Street #210, Waipahu, HI, 96797
Tested Date:	10/21/2019		

Laboratory Data

Sieve Size	Individual Retained (%)	Cumulative Retained (%)
Retained on 3/4 Sieve		
Retained on 3/8 Sieve		
Retained on #4 Sieve		
Passing #4 Sieve		



Method: A (ASTM D1557-12e1)
Preparation Method: Moist
Rammer Type: Manual Round
Specific Gravity: 2.15
Maximum Dry Density (pcf): 56.7
Optimum Moisture (%): 61.2

Soil Classification: Dark Brown Silty Clay

General

PLATE NO. 12

Moisture Density

ASTM D1557

Report #: MF0111-000003

PSC Consultants, LLC
94-547 Ukee Street
Suite 210
Waipahu, HI 96797
Phone: (808) 676-6677
Fax: (808) 676-7733

Client:

Austin, Tsutsumi & Associates
501 Summer Street
St. #521
Honolulu, HI 96817

Project:

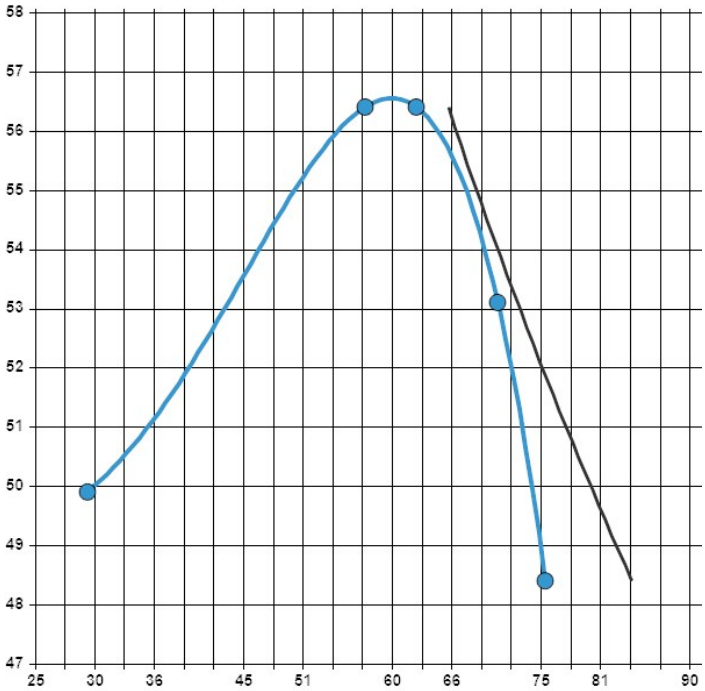
218306.10
Kahikinui Driveway Improvements
Maui, Rock Wall
Kula, HI 96790

Sample Information

Sample Number:	679	**Depth (ft):**	0' - 5' Below Existing Grade
Boring Number:	TP-3B	**Sample From:**	Test Pit
Sampling Method:	Bucket auger ASTM D6907	**Sampled By:**	Ekankang, Hegire
Location:	Kahikinui Driveway Improvements		
Location Details:	TP-3B		
Sample Date:	10/07/2019		
Received Date:	10/18/2019	**Lab:**	94-547 Ukee Street #210, Waipahu, HI, 96797
Tested Date:	10/21/2019		

Laboratory Data

Sieve Size	Individual Retained (%)	Cumulative Retained (%)
Retained on 3/4 Sieve		
Retained on 3/8 Sieve		
Retained on #4 Sieve		
Passing #4 Sieve		



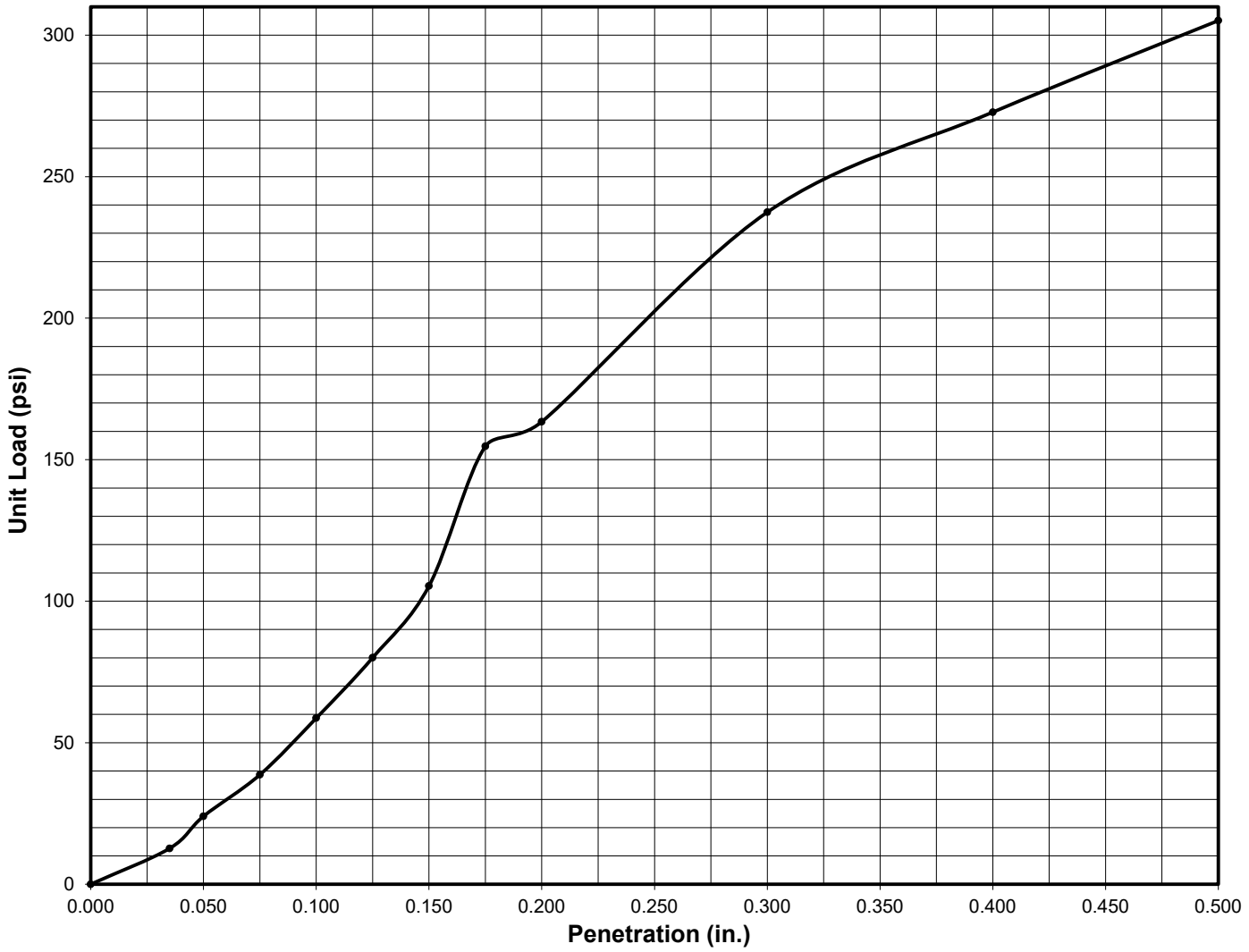
Method: A (ASTM D1557-12e1)
Preparation Method: Moist
Rammer Type: Manual Round
Specific Gravity: 2.25
Specific Gravity Source: Assumed
Maximum Dry Density (pcf): 56.5
Optimum Moisture (%): 60.5

Soil Classification: Reddish-Brown Silty Clay

General

PLATE NO. 12

CBR CURVE



Sample Source: Bulk (TP-2) Sample 677 **Depth:** 0'-5' **Description:** Brown Silt with Gravel

	Before Expansion	After Expansion
Relative Compaction (%):	95.77%	94.90%
Moisture Content (%):	54.30%	61.30%
Dry Density (pcf):	54.30	53.81
Percent Swell or Expansion Value (%):	1.61%	
Compaction Test Method:	ASTM D-1557 C	
CBR Value @ 0.1" :	6	
CBR Value @ 0.2" :	11	

Atterberg Limits

LL	PL	PI

CALIFORNIA BEARING RATIO
ASTM D-1883-94

PSC Consultants, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

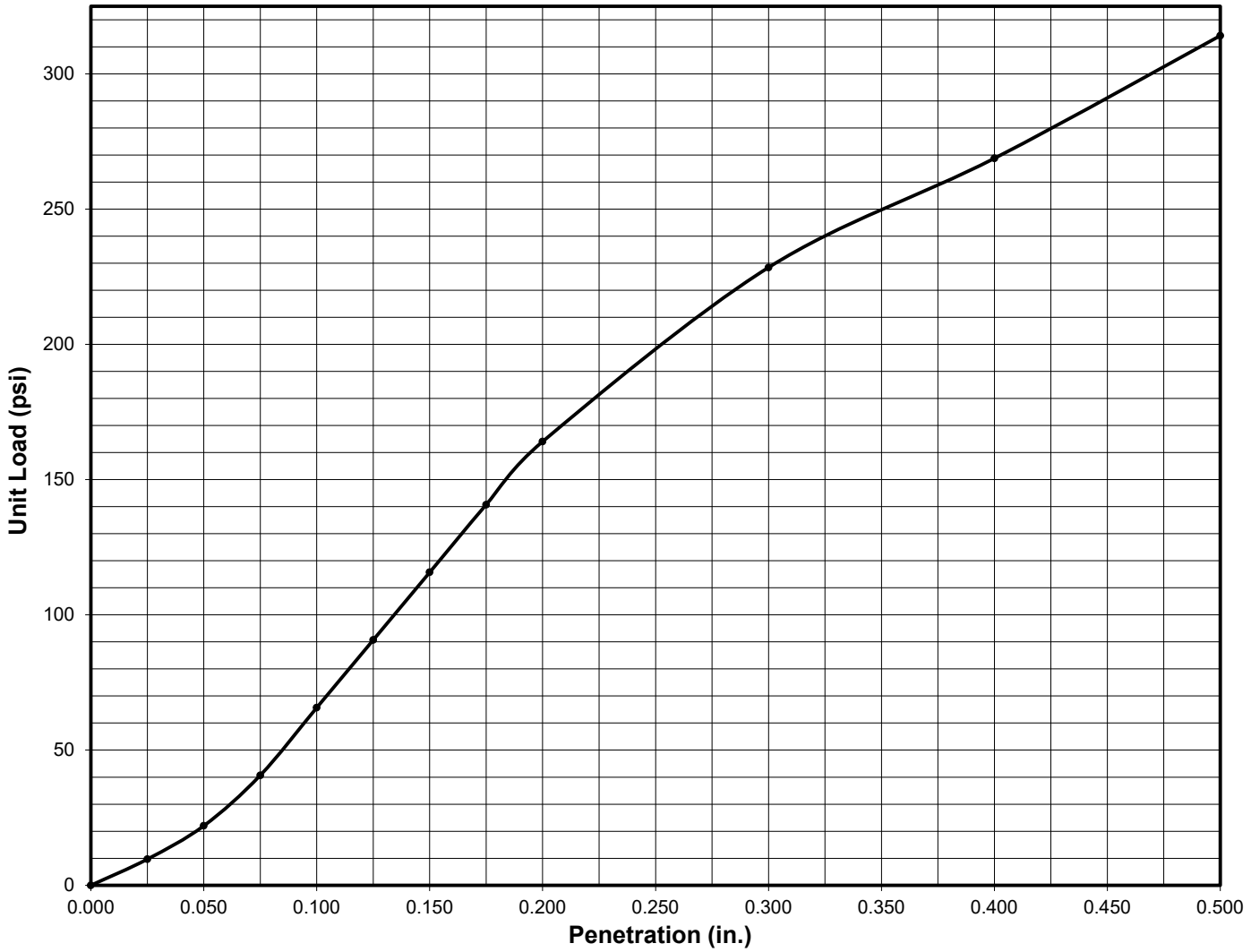
DHHL
Kahikinui Driveway Project
Kula, Kahikinui, Maui, Hawaii

Date: 11/15/19 | PROJECT NO. 218306.10

A:\Labshts\DHHL Kahikinui Driveway CBR TP-2 Sample 677\CBR Curve

PLATE NO. 13

CBR CURVE



Sample Source: Bulk (TP-3A) Sample 678 **Depth:** 0'-5' **Description:** Brown Silt with Gravel

	Before Expansion	After Expansion
Relative Compaction (%):	109.70%	108.14%
Moisture Content (%):	45.60%	48.20%
Dry Density (pcf):	62.20	61.10
Percent Swell or Expansion Value (%):	1.13%	
Compaction Test Method:	ASTM D-1557 C	
CBR Value @ 0.1" :	7	
CBR Value @ 0.2" :	11	

Atterberg Limits

LL	PL	PI

CALIFORNIA BEARING RATIO
ASTM D-1883-94

PSC Consultants, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

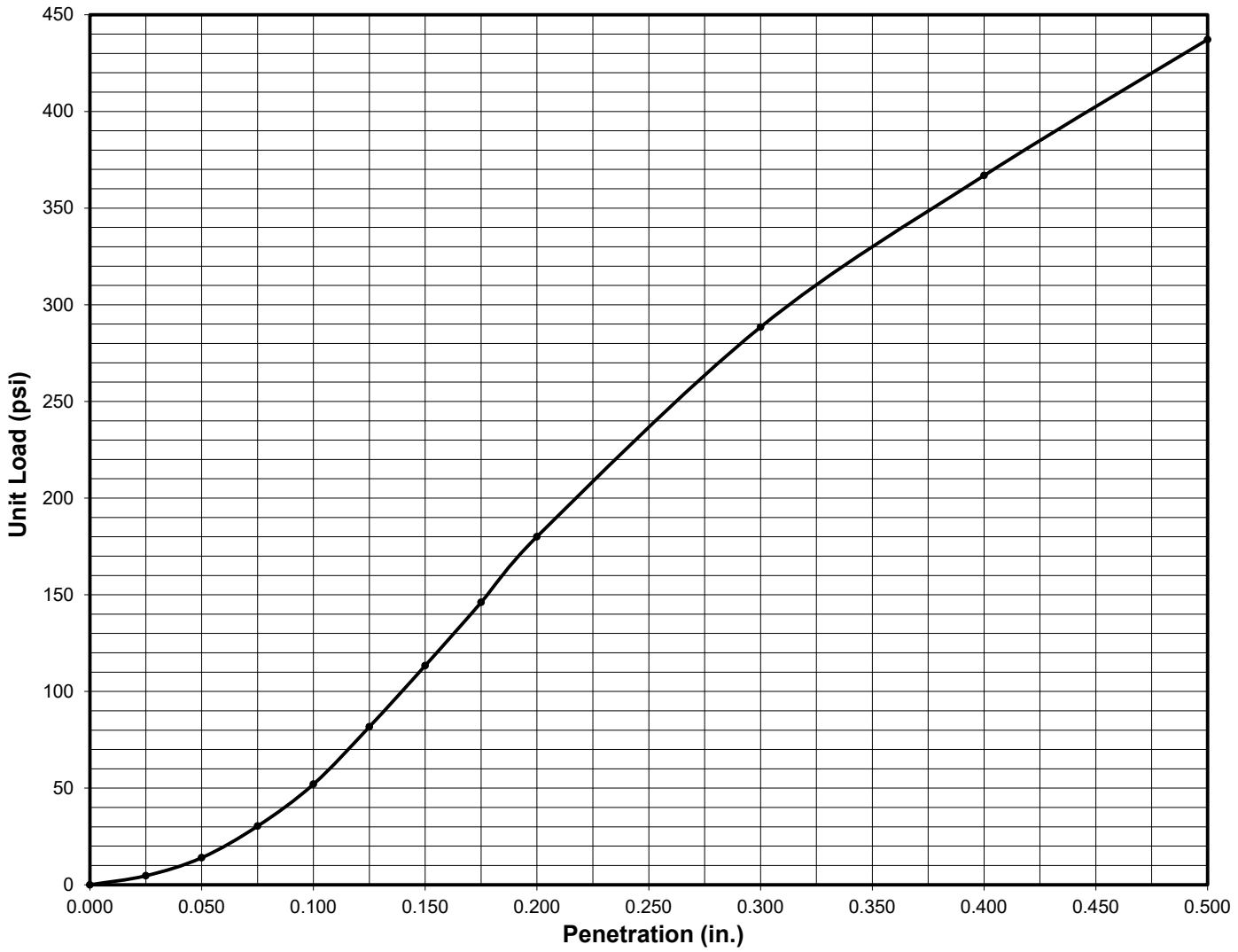
DHHL
Kahikinui Driveway Project
Kula, Kahikinui, Maui, Hawaii

Date: 11/15/19 | PROJECT NO. 218306.10

A:\Labshts\DHHL Kahikinui Driveway CBR TP-3A Sample 678\CBR Curve

PLATE NO. 13

CBR CURVE



Sample Source: Bulk (TP-3B) Sample 679 **Depth:** 0'-5' **Description:** Brown Silt with Gravel

	Before Expansion	After Expansion
Relative Compaction (%):	118.41%	116.64%
Moisture Content (%):	46.30%	48.75%
Dry Density (pcf):	66.90	65.90
Percent Swell or Expansion Value (%):	3.12%	
Compaction Test Method:	ASTM D-1557 C	
CBR Value @ 0.1" :	5	
CBR Value @ 0.2" :	12	

Atterberg Limits

LL	PL	PI

CALIFORNIA BEARING RATIO
ASTM D-1883-94

PSC Consultants, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

DHHL
Kahikinui Driveway Project
Kula, Kahikinui, Maui, Hawaii

Date: 11/15/19 | PROJECT NO. 218306.10

A:\Labshts\DHHL Kahikinui Driveway CBR TP-3B Sample 679\CBR Curve

PLATE NO. 13

Boring No.	Sample Depth	Cohesion	Friction
	(ft)	(psf)	(°)
B-2A	5.0-6.5	180	12.2
B-3A	10.0-11.5	250	26.3
B-4A	15.0-16.5	420	30.1

Direct Shear Test Results (ASTM D3080)

PSC CONSULTANTS, LLC
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Austin, Tsutsumi & Associates, Inc.
DHHL Kahikinui Driveway Improvements Project
Phase 1
Kahikinui, Maui. Hawaii

DATE: 11/15/2019 | PROJECT NO. 218306.10

PLATE NO. 14

Draft
Archaeological Inventory Survey Report for the Kahikinui Homesteads Road Improvements Project, Kīpapa Ahupuaʻa, Hāna District, Maui, TMK: [2] 1-9-001:003

Prepared for
Austin, Tsutsumi & Associates, Inc.
&
Department of Hawaiian Homelands

Prepared by
Jonas K. Madeus, B.A.,
Josephine M. Yucha, M.S.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Wailuku, Hawaiʻi
(Job Code: KIPAPA 2)

October 2019

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Management Summary

Reference	Archaeological Inventory Survey Report for the Kahikinui Homesteads Road Improvements Project, Kīpapa Ahupua‘a, Hāna District, Maui, TMK: [2] 1-9-001:003 (Madeus et al. 2019)
Date	October 2019
Project Number	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: KIPAPA 2
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 19-07, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	SHPD; State Department of Hawaiian Home Lands (DHHL)
Land Jurisdiction	State of Hawai‘i (DHHL)
Project Proponent	Austin, Tsutsumi & Associates, Inc.
Project Funding	State of Hawai‘i
Project Location	The project area is located on the southern leeward slopes of Haleakalā approximately 2.6 km (1.64 mi) upslope (north) of Pi‘ilani Highway (Route 31). The project area is on moderately sloping ground approximately 4.75 km (2.95 mi) north of the shoreline, 7.74 km (4.81 mi) southwest of Haleakalā Crater, and 3.39 km (2.44 mi) northeast of Lualaʻilua Hills. The project area is depicted on a portion of the 1995 Lualailua Hills U.S. Geological Survey 7.5-minute topographic quadrangle.
Project Description	The proposed project includes improvements to existing roadways within the DHHL Kahikinui Homesteads. The project will proceed in three phases, addressing different sections of road with each phase. Planned improvements include, but may not be limited to, re-grading portions of the existing road surface, cutting of new road surfaces where the erosional state of the current road forbids resurfacing, possible demolition and replacement of concrete-paved sections of road currently in an advanced state of disrepair, repair of existing drainage culverts, installation of new drainage culverts along realigned roadway/newly constructed road sections, and the placement of at least three ford crossings where drainage gulches routinely wash away the road surface.
Project Acreage	The project area is 36.4 acres (14.7 hectares).
Historic Preservation Regulatory Context	CSH conducted an archaeological literature review and field inspection (LRFI) in February 2019 to provide a synopsis of past land use and a summary of previous archaeological studies conducted in the project area (Royalty et al. 2019). This information was used in preparation of a field inspection to locate previously documented

	historic properties in the region and to predict the types of historic properties that may be present in the project area. The field inspection identified two potential historic properties including a complex of four agricultural terraces (designated as State Inventory of Historic Places [SIHP] # 50-50-15-8673), and a complex of four mounds designated as SIHP # 50-50-15-8674. The LRFI also confirmed that no previously documented historic properties were located within the current project area. During a 12 July 2019 meeting at the SHPD Maui Office, the results of the LRFI were presented to SHPD staff along with notice that CSH would proceed with the completion of an AIS to further document these findings. This AIS investigation fulfills the requirements of HAR §13-13-276 and was conducted to identify, document, and assess significance of any historic properties. This document is intended to support the proposed project's historic preservation review under Hawai‘i Revised Statutes (HRS) §6E-8 and HAR §13-13-275. It is also intended to support any project-related historic preservation consultation with stakeholders, such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups.
Fieldwork Effort	Fieldwork was accomplished on 15 through 17 July 2019 by Jonas Madeus, B.A., and Jay Rapoza, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. This work required approximately six person-days to complete.
Historic Properties Identified and Historic Property Significance	SIHP # 50-50-15-8673 is a complex of four agricultural terraces. It is assessed as significant pursuant to HAR §13-13-275-6, Criterion "d" (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area. SIHP # 50-50-15-8674 is a complex of four mounds. It is assessed as significant pursuant to HAR §13-13-275-6, Criterion "d" (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.
Effect Recommendation	Two historic properties (SIHP #s -8673 and -8674) were identified during the AIS that have the potential to be affected by project construction. This AIS report provides sufficient documentation of these historic properties. As such, the effect recommendation for the

	current project is “no historic properties affected”, per HAR §13-13-275-7.
Mitigation Recommendations	No further work is recommended for the two historic properties identified during the AIS. SIHP #s -8673 and -8674 have been sufficiently documented by this AIS and have reached their information potential. This AIS report also provides sufficient documentation of the information important to research on prehistory or history for each historic property including location, dimensions, content, representative photographs, plan and profile maps, age, function, integrity, and significance.

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Section 1 Introduction

1.1 Project Background

At the request of Austin, Tsutsumi & Associates, Inc., and on behalf of the State Department of Hawaiian Homelands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological inventory survey (AIS) report for the Kahikinui Homesteads Road Improvements Project, Kīpapa Ahupua‘a, Hāna District, Maui, TMK: [2] 1-9-001:003. The project is located on the southern leeward slopes of Haleakalā approximately 2.6 km (1.64 mi) upslope (north) of Pi‘ilani Highway (Route 31). The project area is depicted on a portion of the 1995 Lualailua Hills U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2016 aerial photograph (Figure 3).

The project area is understood to include 36.4 acres (14.7 hectares) of developed roadway fronting several established residential lots (Lot Nos. -1, -2, -25, -26, -70 through -75, -77, -78, -90, -91, and -94 through -105) (Figure 4). The project will proceed in three phases (Phase I, II, and III) to address different sections of the road with each phase, starting at the southern extent of the project area and moving north. According to preliminary construction plans, the improvements to be undertaken during this project will include re-grading of portions of the existing road surface, cutting of a new road surface where the erosional state of the current road forbids resurfacing, demolition and replacement of concrete-paved sections of road currently in advanced states of disrepair, repair of existing drainage culverts, installation of new drainage culverts along realigned/newly constructed road sections, and the placement of at least three ford crossings where drainage gulches routinely wash away the road surface.

1.2 Historic Preservation Regulatory Context

CSH conducted an archaeological literature review and field inspection (LRFI) in February 2019 to provide a synopsis of past land use and a summary of previous archaeological studies conducted in the project area (Royalty et al. 2019). This information was used in preparation of a field inspection to locate previously documented historic properties in the region and to predict the types of historic properties that may be present in the project area.

The field inspection identified two potential historic properties including a complex of four agricultural terraces (designated as State Inventory of Historic Places [SIHP] # 50-50-15-8673), and a complex of four mounds designated as SIHP # 50-50-15-8674. The LRFI also confirmed that no previously documented historic properties were located within the current project area.

During a 12 July 2019 meeting at the SHPD Maui Office, the results of the LRFI were presented to SHPD staff along with notice that CSH would proceed with the completion of an AIS to further document these findings.

This AIS investigation fulfills the requirements of HAR §13-13-276 and was conducted to identify, document, and assess significance of any historic properties. This document is intended to support the proposed project’s historic preservation review under Hawai‘i Revised Statutes (HRS) §6E-8 and HAR §13-13-275. It is also intended to support any project-related historic preservation consultation with stakeholders, such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups.

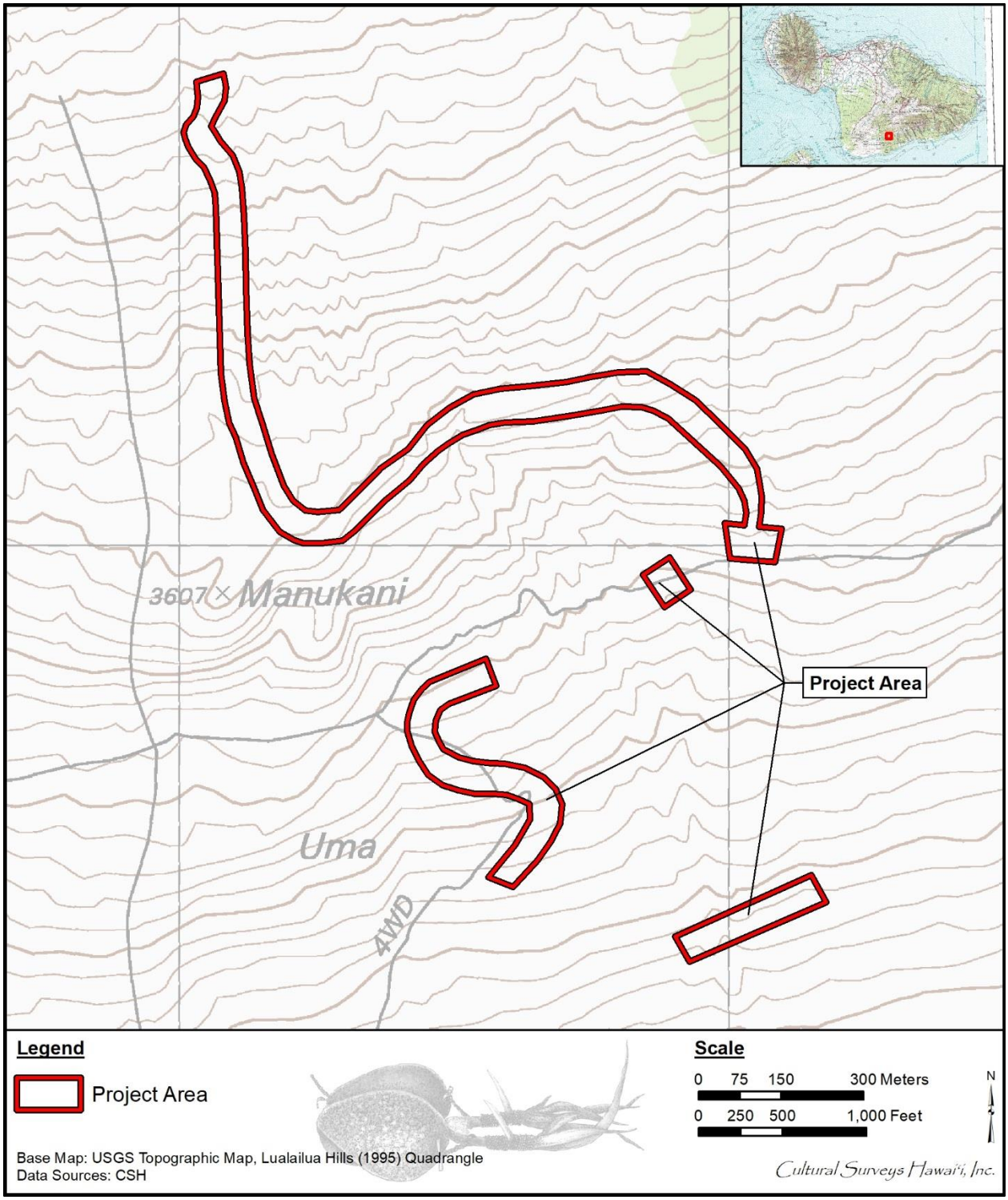

Figure 1. Portion of the 1995 Lualailua Hills USGS 7.5-minute topographic quadrangle showing the location of the project area (U.S. Geological Survey 1995)

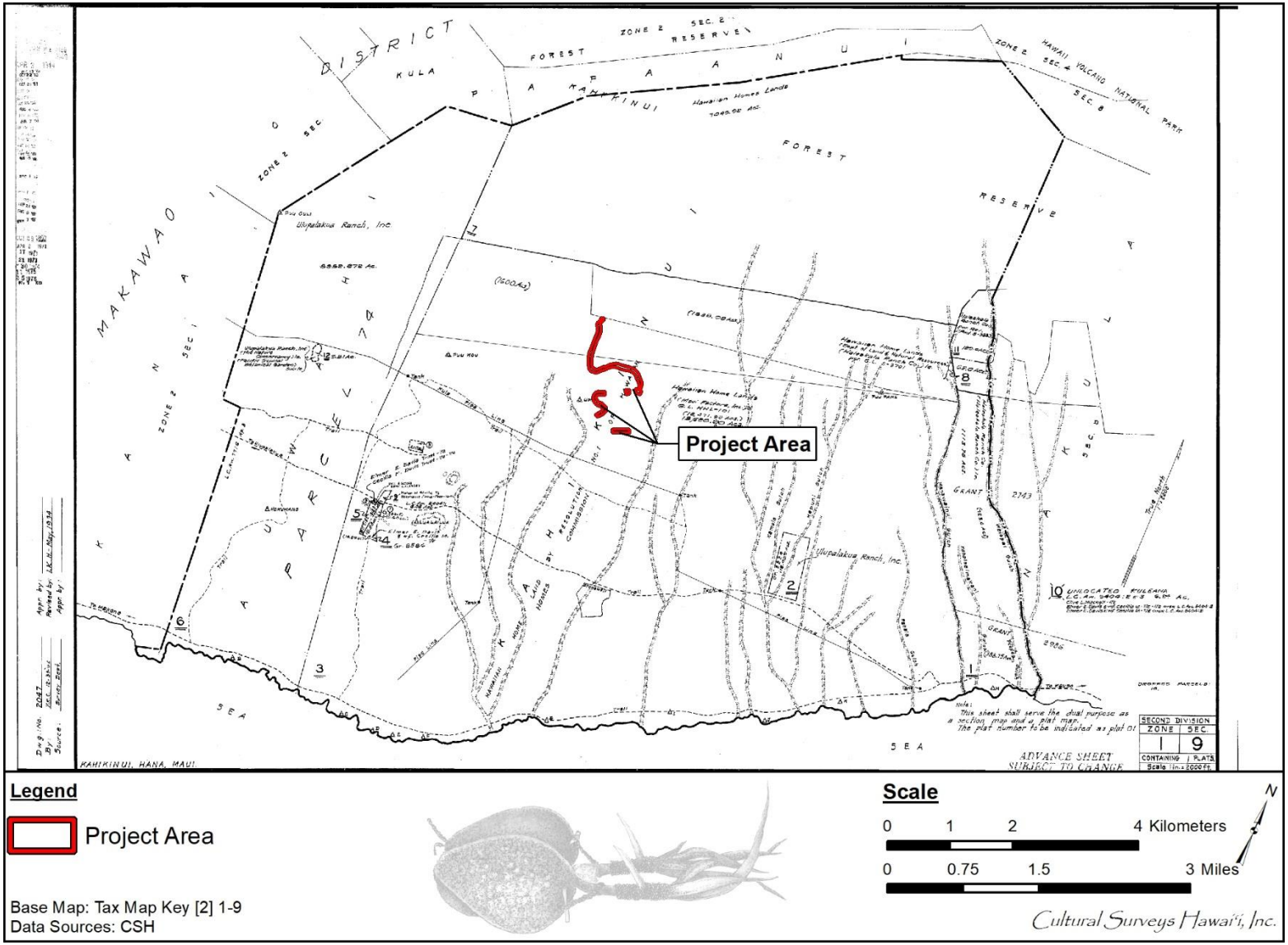

Figure 2. Tax Map Key (TMK) [2] 1-9 showing the project area (Hawaii TMK Service 2014)

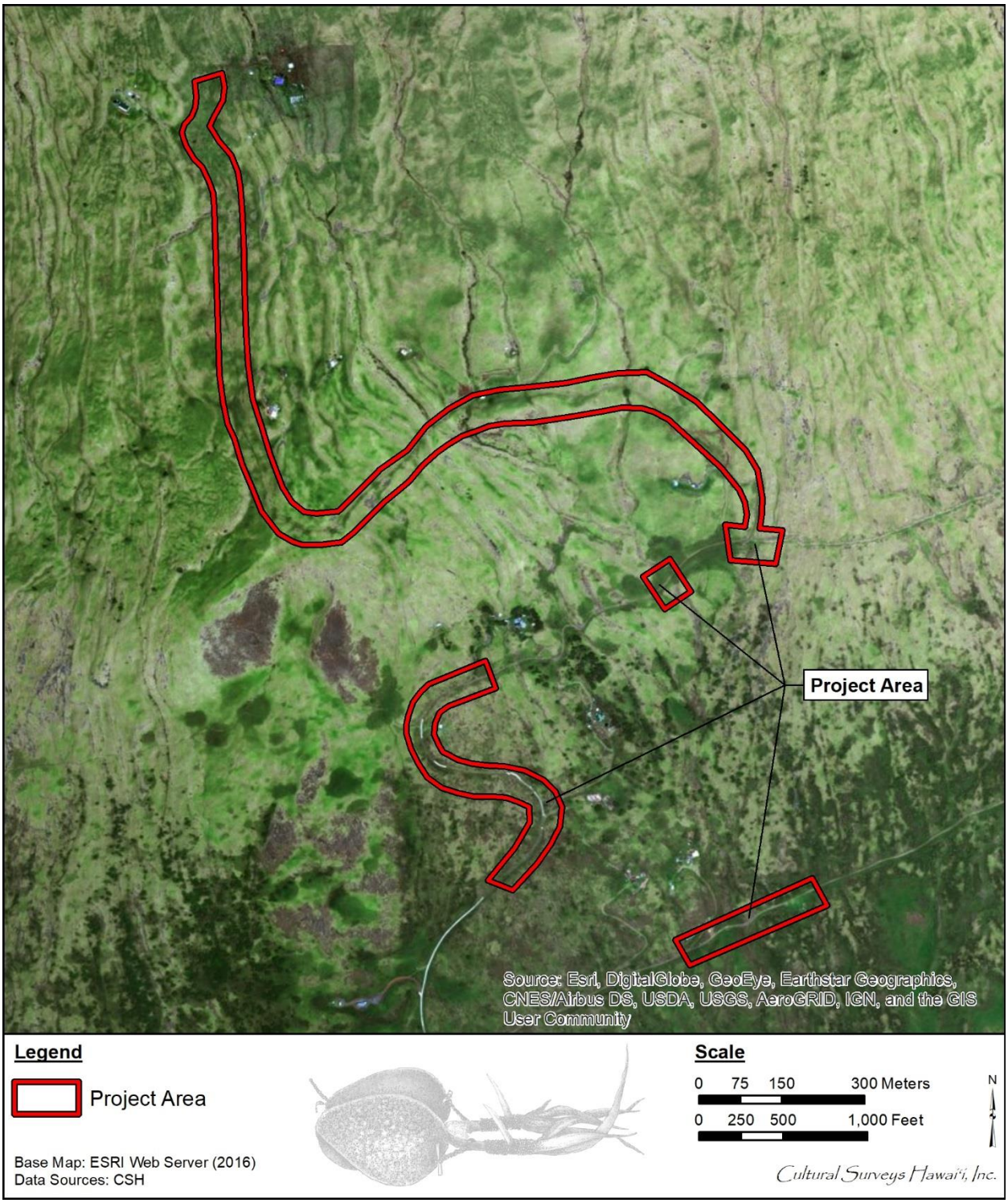

Figure 3. Aerial photograph showing the location of the project area (Esri 2016)

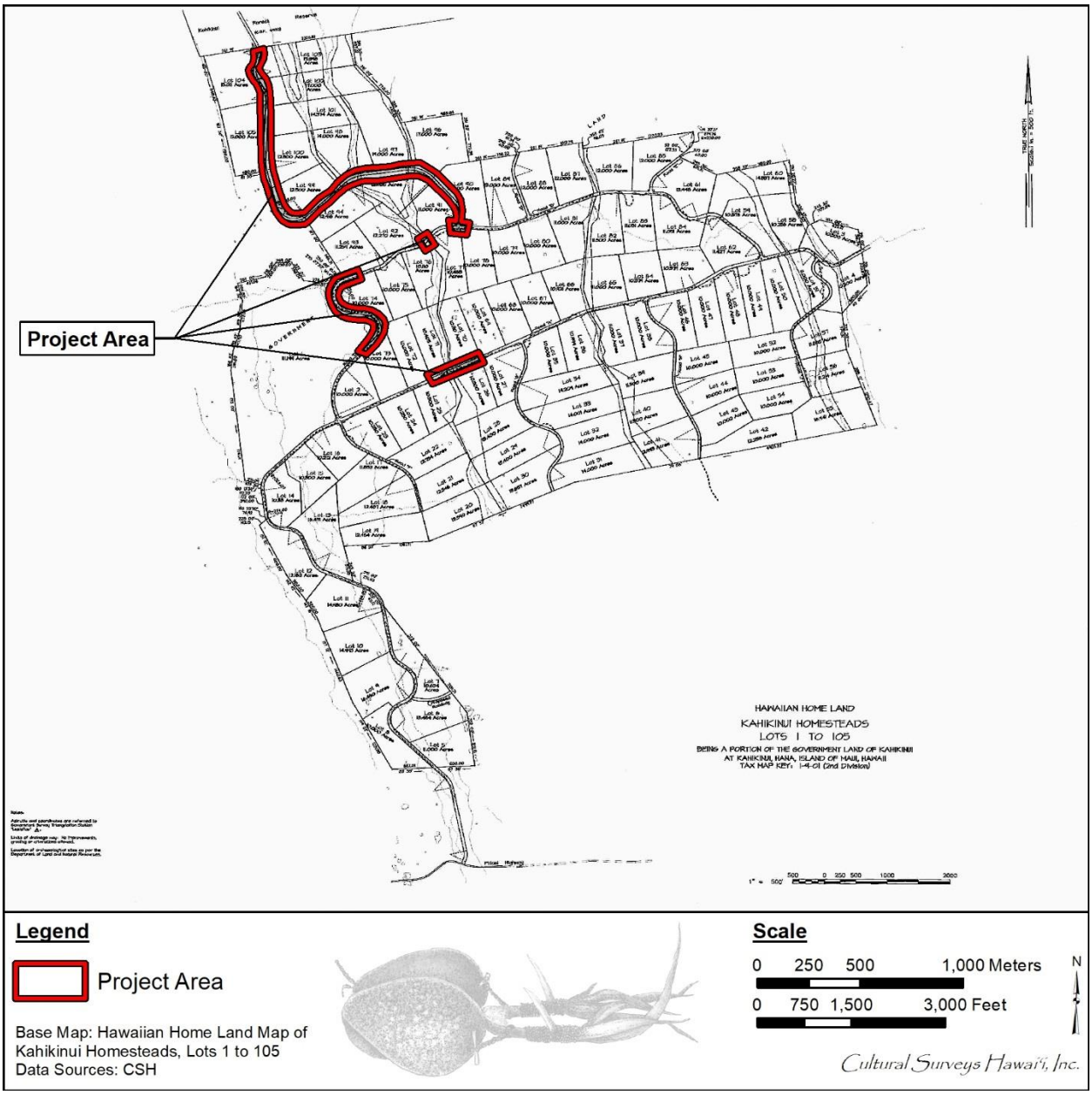

Figure 4. Map of the Kahikinui Homesteads development showing lot boundaries and road sections included in the current project area (Department of Hawaiian Home Lands n.d.)

The identification, documentation, and evaluation of in-use potential architectural historic properties, such as historic buildings and structures, was outside the scope of this AIS. Throughout this report the term “historic properties” is used and should be generally understood to refer to archaeological historic properties, unless otherwise stated.

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is located on the steep portion of the southern leeward slope of Haleakalā approximately 4.75 km (2.95 mi) northwest of the shoreline, 7.74 km (4.81 mi) southwest of Haleakalā Crater, and 3.93 km (2.44 mi) northeast of Lualaʻilua Hills. The elevation of land within the project area ranges from 823 to 1280 m (2,700 to 4,200 ft) above mean sea level (AMSL).

In 2014, the average monthly air temperature for the project area was between 14.89°C (58.81°F) in February and 18.92°C (66.05°F) in August with an average annual air temperature of 16.91°C (62.44°F) (Giambelluca et al. 2014). The land in the vicinity of the project area received a mean annual rainfall of 740.7 mm (29.2 in) between 1978 and 2007, according to the University of Hawai‘i 2011 *Rainfall Atlas of Hawaii* (Giambelluca et al. 2013*)*.

Vegetation observed within the project area includes kikuyu grass (*Pennisetum clandestinum*), *koa haole* (*Leucaena leucocephala*), plume poppy (*Bocconia frutescens*), tinaroo glycine (*Glycine wightii*), largeleaf lantana (*Lantana camara*), castor bean (*Ricinus communis*), thimbleberry (*Rubus rosifolius*), Madagascar ragwort (*Senecio madagascariensis*), lion’s ear (*Leonotis nepetifolia*), Jamaica vervain (*Stachytaroheta*), and white shrimp plant (*Justicia betonica*).

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area’s soils consist of Puu Pa very stony silt loam, 7 to 40 percent slopes (PZVE) and Very stony land (rVS) (Figure 5).

Puu Pa very stony silt loam, 7 to 40 percent slopes (PZVE) soils are described as follows:

> This series consists of well-drained soils on uplands on the island of Maui. These soils developed in volcanic ash overlying fragmental Aa lava. They are moderately sloping to steep. Elevations range from 1,000 to 2,200 feet. … Puu Pa soils are geographically associated with Uma and Waiakoa Soils.
>
> This soil is on the southern intermediate slopes of Haleakala. The landscape is dissected by many small gulches. … Permeability is moderately rapid. Runoff is slow to medium, and the erosion hazard is slight to moderate. The available water capacity is about 1.7 inches per foot in the surface layer and subsoil. In places roots penetrate to a depth of 3 feet of more. (Foote et al. 1972:118)

Very stony land (rVS) soils are described as follows:

> This land type consists of areas where 50 to 90 percent of the surface is covered with stones and boulders. … This land type occurs on Maui, Molokai, and Lanai. The slope ranges from 7 to 30 percent. Included in mapping were very steep gulches.

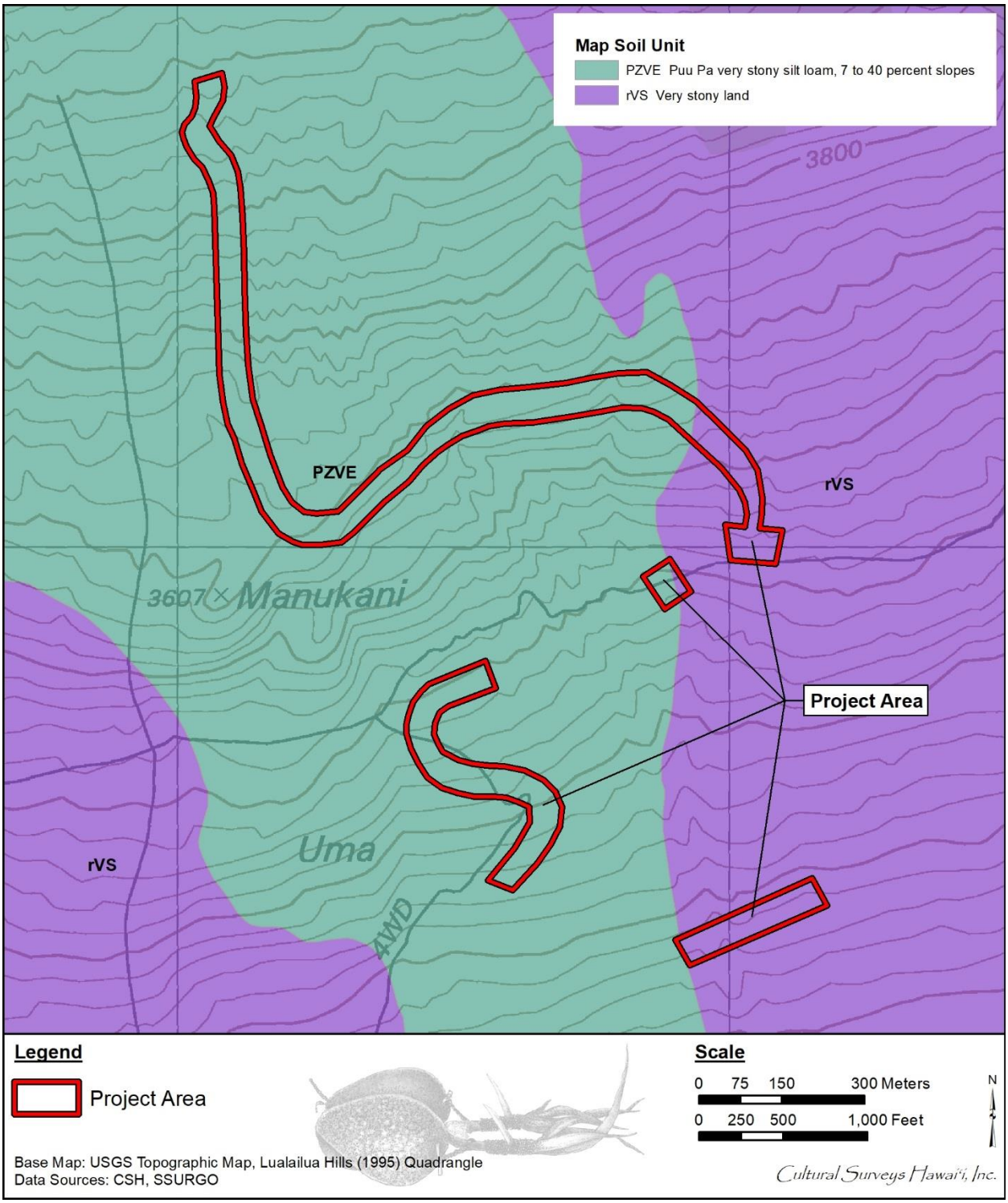

Figure 5. Overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (U.S. Department of Agriculture 2001)

> On Maui, this type consists of young Aa lava that has a thin covering of volcanic ash that locally extends deep into cracks and depressions. It occurs as large areas, mainly on the upper slopes of Mt. Haleakala at elevations between 4,000 and 9,000 feet. The annual rainfall amounts to 30 to 40 inches. The ash-covered areas support a stand of shrubs and grasses.
>
> This land type is used for pasture and wildlife habitat. Pasture improvement is very difficult because of the many stones. (Foote et al. 1972:124)

1.3.2 Built Environment

The built environment of the project area includes the driveway that extends from Pi‘ilani Highway (Route 31) northward to provide access to the individual homestead lots and community buildings on the property. Observed driveway surfaces include poured concrete, concrete paving strips, dirt, and gravel. In some areas, overgrown alignments of former ranch roads are visible. Residents of the area also informed CSH that subsurface utility lines (electric, phone, internet) are buried in the driveway corridor. The Auwahi Wind Turbines are located 4.9 km (3.1 mi) southwest of the westernmost extent of the project area. The project area is also located approximately 7.8 km (4.82 mi) south by southeast of the Observatory located on the summit of Haleakalā at Red Hill.

Section 2 Methods

No artifacts or faunal remains were observed, and no sediment samples were collected. As such, no laboratory analyses were required for the AIS. All data generated during the course of the AIS are stored at the CSH offices.

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological permit # 19-07, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was accomplished on 15 through 17 July 2019 by Jonas Madeus, B.A., and Jay Rapoza, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. This work required approximately six person-days to complete.

2.1.1 Pedestrian Survey

A 100%-coverage pedestrian inspection of the project area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps spaced approximately 5 m apart. Documentation included the inspection of any potential archaeological features, and a thorough recordation of newly identified historic properties. Documentation included descriptions, photographs, and hand-drawn maps using Apple iPads equipped with standard digital form software and with digital cameras.

2.1.2 GPS Data Collection

CSH archaeologists used a hand-held Garmin GPS unit (accuracy +/- 3 m) uploaded with a shapefile of the project area boundaries to complete the field inspection. All points of interest or potential historic property locations were recorded with the GPS unit and uploaded to ArcGIS for inclusion on project maps.

2.2 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai‘i State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina (2000) database.

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of historic properties in the project area.

Section 3 Background Research

3.1 Traditional and Historical Background

Prior to Western Contact, the Island of Maui was divided into 12 *moku*, or districts. Kahikinui Moku was one among nine *moku* that divided East Maui on the slopes of Mauna Haleakalā, and one of the five leeward *moku* of Haleakalā's southern shore. The area was inhabited by both coastal and upland communities, generally specializing in both marine resource gathering and upland "dry" (non-irrigated) farming on the lower slopes and in the upland forest zone (E.S.C. Handy in Sterling 1998:192). Within Kahikinui Moku a population explosion was experienced accompanying the intensification of leeward agriculture between the fifteenth and eighteenth centuries, resulting in an expansion from around 400 persons to nearly 4000 persons within that time (Kirch 2012:167-168). Reflections of this formerly sizeable population can be seen in the extensiveness of both coastal and *mauka* (upslope) archaeological remains (Cordy and Dixon 1997; Kirch et al. 1997; Walker 1931:92, 248, 249)

Place names within Kahikinui Moku, more specifically within close proximity to Kīpapa Ahupua‘a (a further subdivision of the larger *moku*), may offer some insight into the settlement and land use patterns of the traditional Hawaiian inhabitants. The name Kahikinui itself translates as "Great Tahiti," said to be named for the land's resemblance to the distant island of Tahiti (Pukui et al. 1974:64; John H. Wise in Sterling 1998:194). There are also several named *pu‘u* (hills) within the *moku*, such as: Pu‘u Kou, literally "*kou* tree hill" (named for a useful common wood); Lualaʻilua Hills, literally "two-fold tranquility"; and Pu‘u Pane, literally "answering hill" (Abbott 1992; Pukui et al. 1974:117-118, 135, 205). Perhaps most telling is the name of the *ahupua‘a*, of Kīpapa, meaning "to lie/be placed prone," likely referring to the numerous battles that were fought along coastal Kahikinui between Hawai‘i Island and Maui forces during pre-Contact times (Pukui et al. 1974:112-113). The distribution of these named features can be seen on maps as early as 1885 along with early thoroughfares through the region (Figure 6).

Following Western Contact and during the Māhele of 1848, a time when the lands of Hawai‘i were being transitioned into a westernized model of private fee-simple ownership, large tracts of Kahikinui Moku were leased to various cattle ranchers for use as pasturage by the Government (Chinen 1958; Kirch 2012:112). This practice continued through the historic period despite the *moku* becoming established as Hawaiian Home Lands by the U. S. Congress at the request of Prince Jonah Kūhio‘ō Kalanianaʻole in 1920 (Kirch 2012:112). The Wall (1915) Map of Kahikinui shows vast tracts of land owned by the Government in the upland regions of the *moku*, in addition to numerous grants and leases in the lower elevations (Figure 7). Indicative of the ranching land use of this region for the time is the 12,655 ac. General Lease No. 1458, awarded to Ulupalakua Ranch until the year 1944 for cattle pasturage. Infrastructure related to these endeavors (cattle walls, water tanks, and water pipelines) can be seen on maps of the region well into the late 1920s (Figure 8).

Prior to the late 1920s, the overland route through Kahikinui consisted primarily of foot and horse trails that were often damaged by, and seldom repaired after, violent rain storms sweeping through the region. Additionally, the southern route through Kaupo and Kahikinui ended at

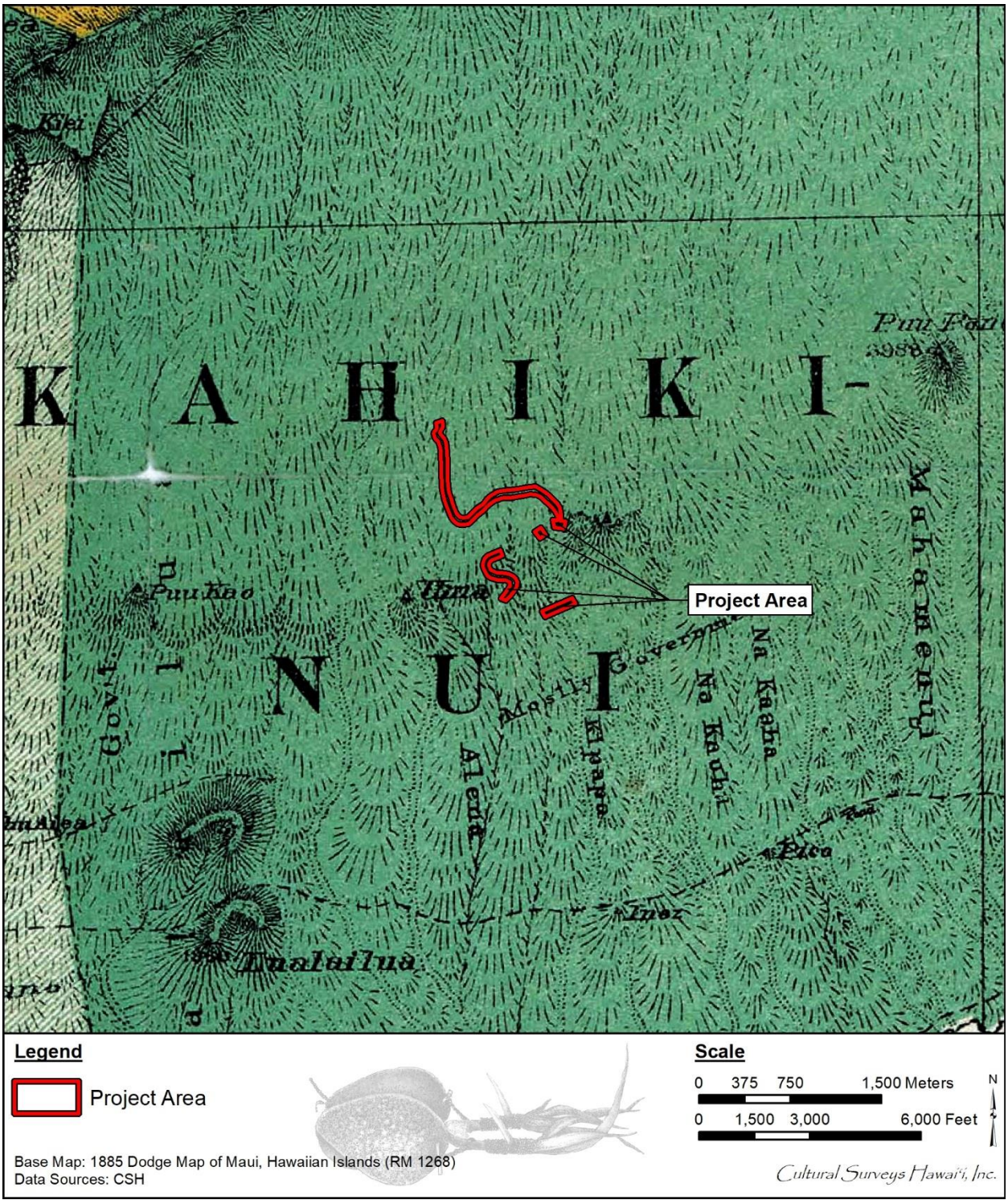

Figure 6. Portion of the Dodge (1885) Survey Map of Maui, showing the project area in relation to the distribution of named *pu‘u* and early road alignments through the region

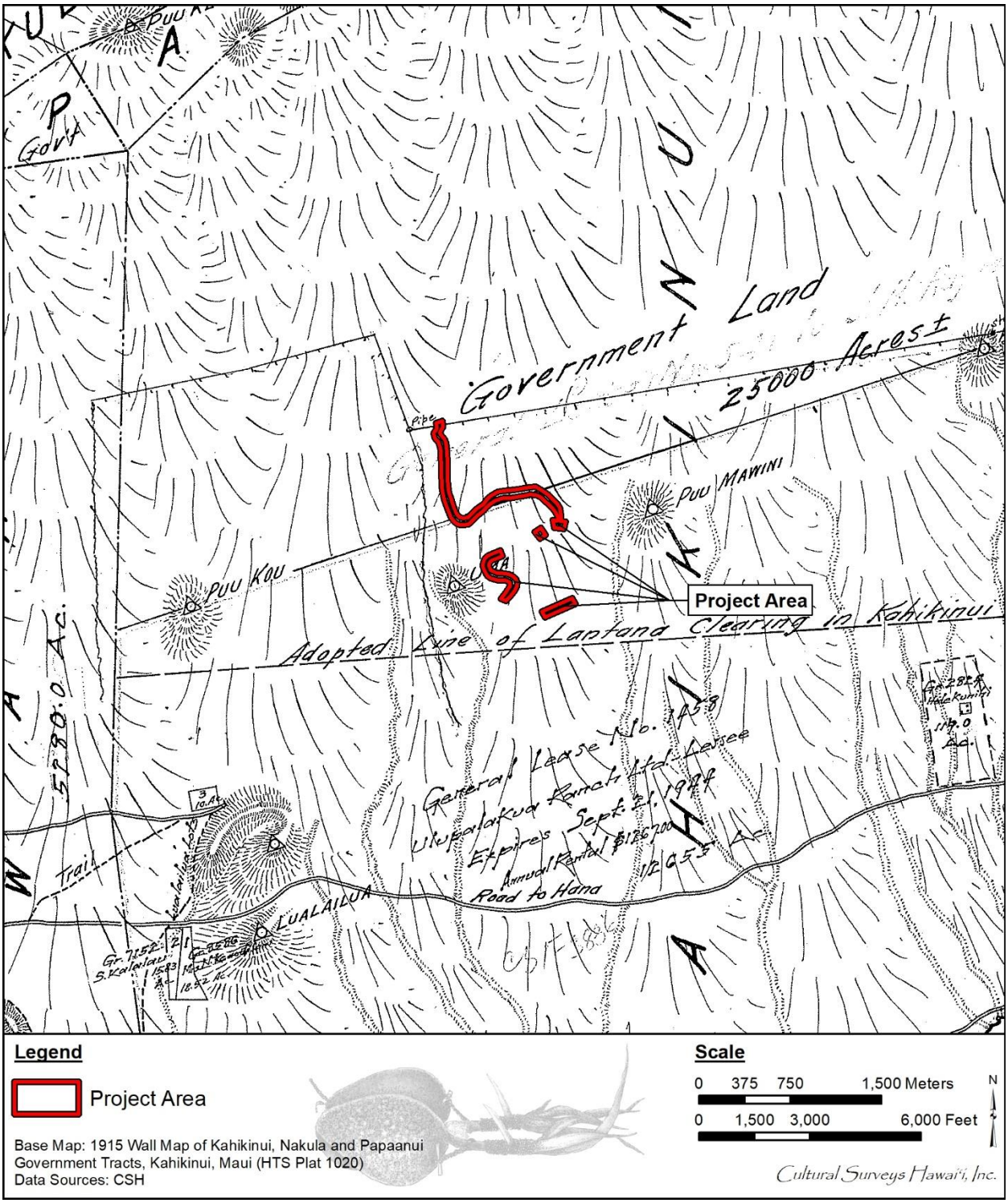

Figure 7. Portion of the Wall (1915) map showing the project area in relation to Government-owned tracts of land in addition to the Ulupalakua Ranch lease area

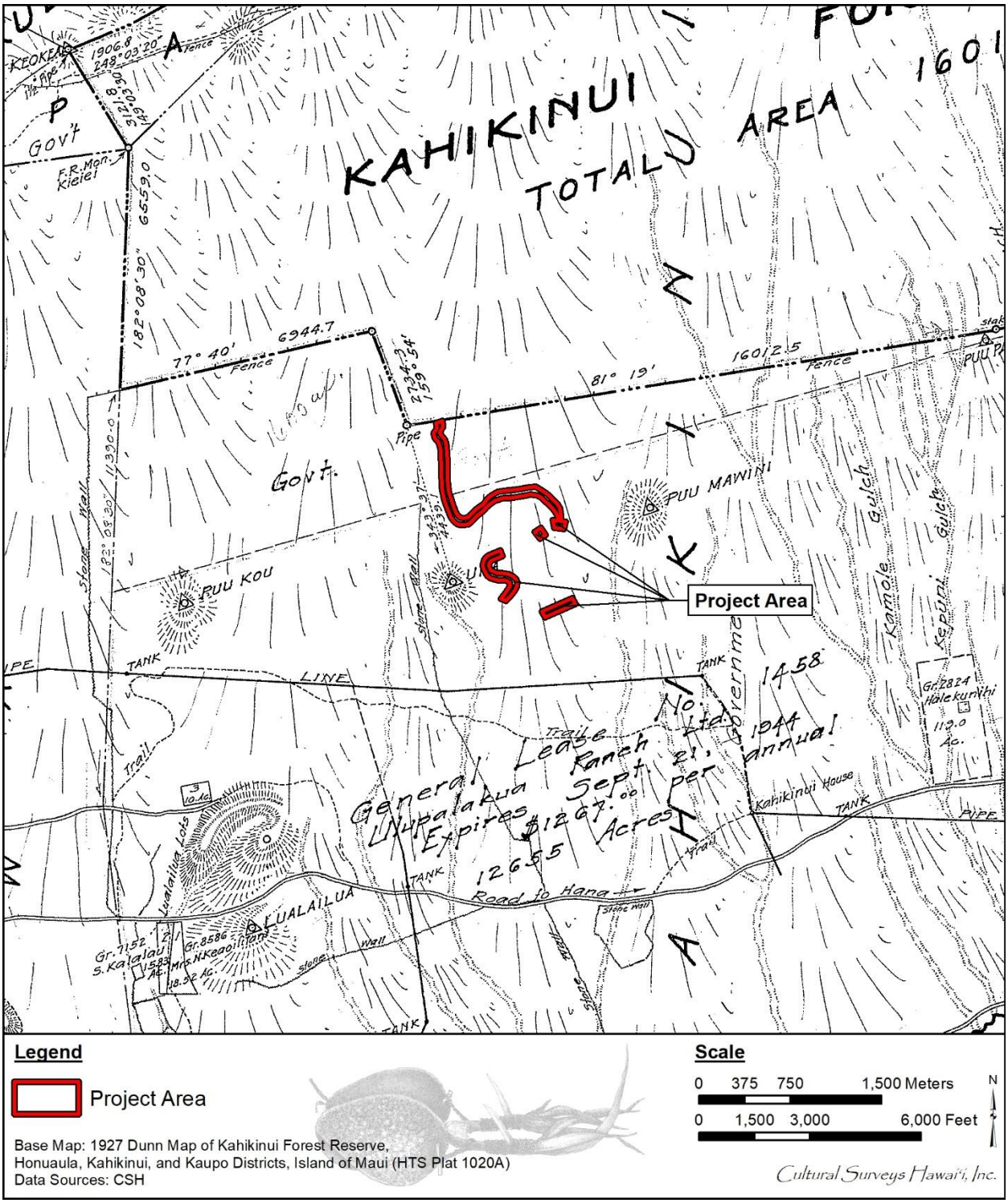

Figure 8. Portion of the Dunn (1927) map showing the project area in relation to Government lands (Kahikinui Forest Reserve) and Ulupalakua Ranch lease area, displaying the expansion of cattle-related infrastructure (walls, tanks, and pipeline)

Kipahulu, offering adventurous travelers little incentive to brave the road since Hāna could not be easily reached (MKE Associates LLC and Fung Associates 2013:2-14). The lands of Kahikinui saw little residential development through the mid twentieth century. Maps created during this time illustrate this lack of development with the only defining features being alternate alignments of Pi‘ilani Highway around the Lualaʻilua Hills area and the *makai* extensions of the Kula Pipeline (Figure 9) (United States Department of the Interior 1933). As would-be residents and ranchers continued to utilize this area, the network of jeep roads expanded considerably on either side of Pi‘ilani Highway through the 1950s (Figure 10) (U.S. Geological Survey 1957). Although the Hāna Belt Road was complete by the year 1926, it still lacked a consolidated pavement to make the travelling easier around the leeward side of Haleakalā, which may explain the proliferation of jeep trails. This continued until the route was added to the jurisdiction of the County of Maui in 1969 (Duensing 2001:17).

The presence of an extensive network of Jeep Trails on the U.S. Geological Survey (1975) map illustrates the difficult nature of travel through the *moku* prior to the pavement of the Pi‘ilani Highway, with trails being even more numerous in the 1975 map than in the 1957 map (Figure 11). Some jeep trails remain in use today as the alignment of these trails with the roadway of the current project area show in the 1975 map. Following the complete pavement of the Hāna Belt Road in 1969, travel through Kahikinui Moku must have become significantly easier (Duensing 2001:22). Even after pavement, the County-owned Pi‘ilani Highway has historically seen much less improvement than its North Shore counterpart, and to this day still becomes frequently washed out by some of the more severe leeward storms (Duensing 2001:23).

A shift in the land use of Kahikinui away from cattle pasturage and toward dedicated residential use came in 1993 when a grassroots group of Native Hawaiians, called Ka ‘Ohana o Kahikinui (the Family of Kahikinui), occupied the ruins of the then out-of-use St. Ynez Church (Kirch 2012:112). Continued occupation of the lands of Kahikinui by Ka ‘Ohana o Kahikinui accompanied by government lobbying ended up in the establishment of a 2,000-acre parcel to be designated as the modern DHHL Kahikinui Homesteads residential development, the location of the current project area.

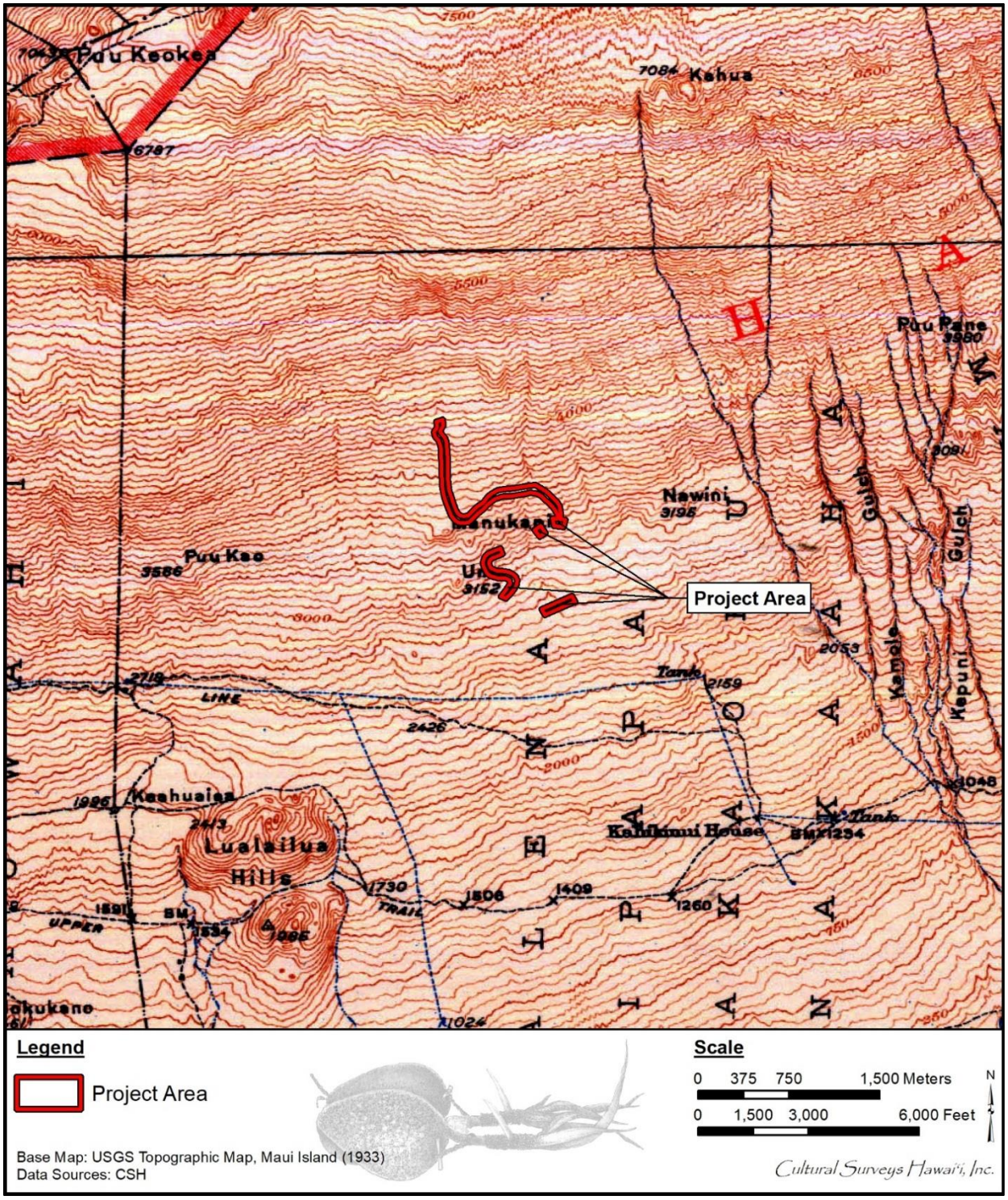

Figure 9. Portion of the 1933 Maui Island USGS topographic quadrangle showing the project area in relation to the Kula Pipeline and an expansion of access roads (U.S. Geological Survey 1933)

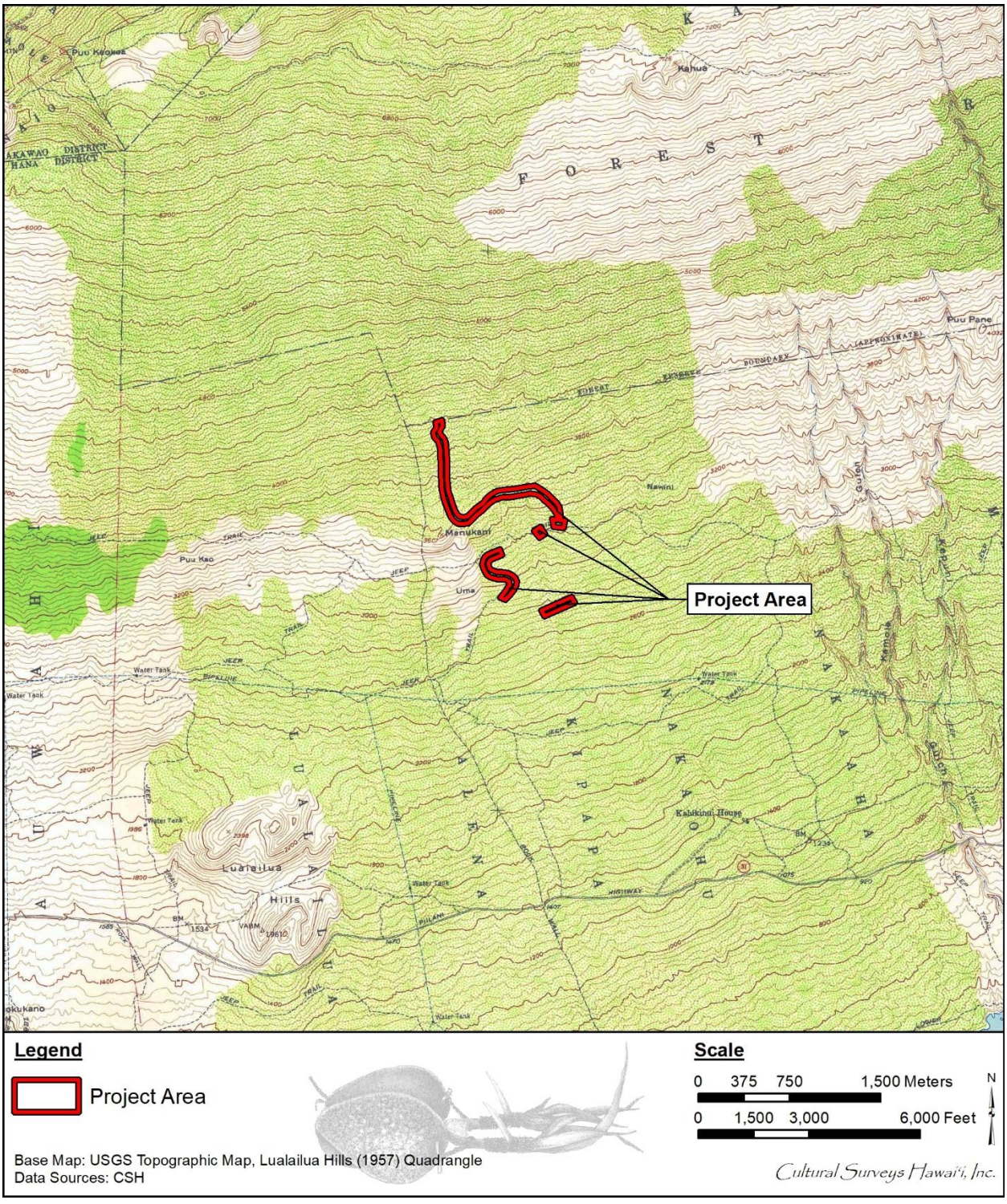

Figure 10. Portion of the 1957 Lualailua Hills topographic quadrangle showing the project area in relation to a further expanded network of jeep trails in the *mauka* regions (U.S. Geological Survey 1957)

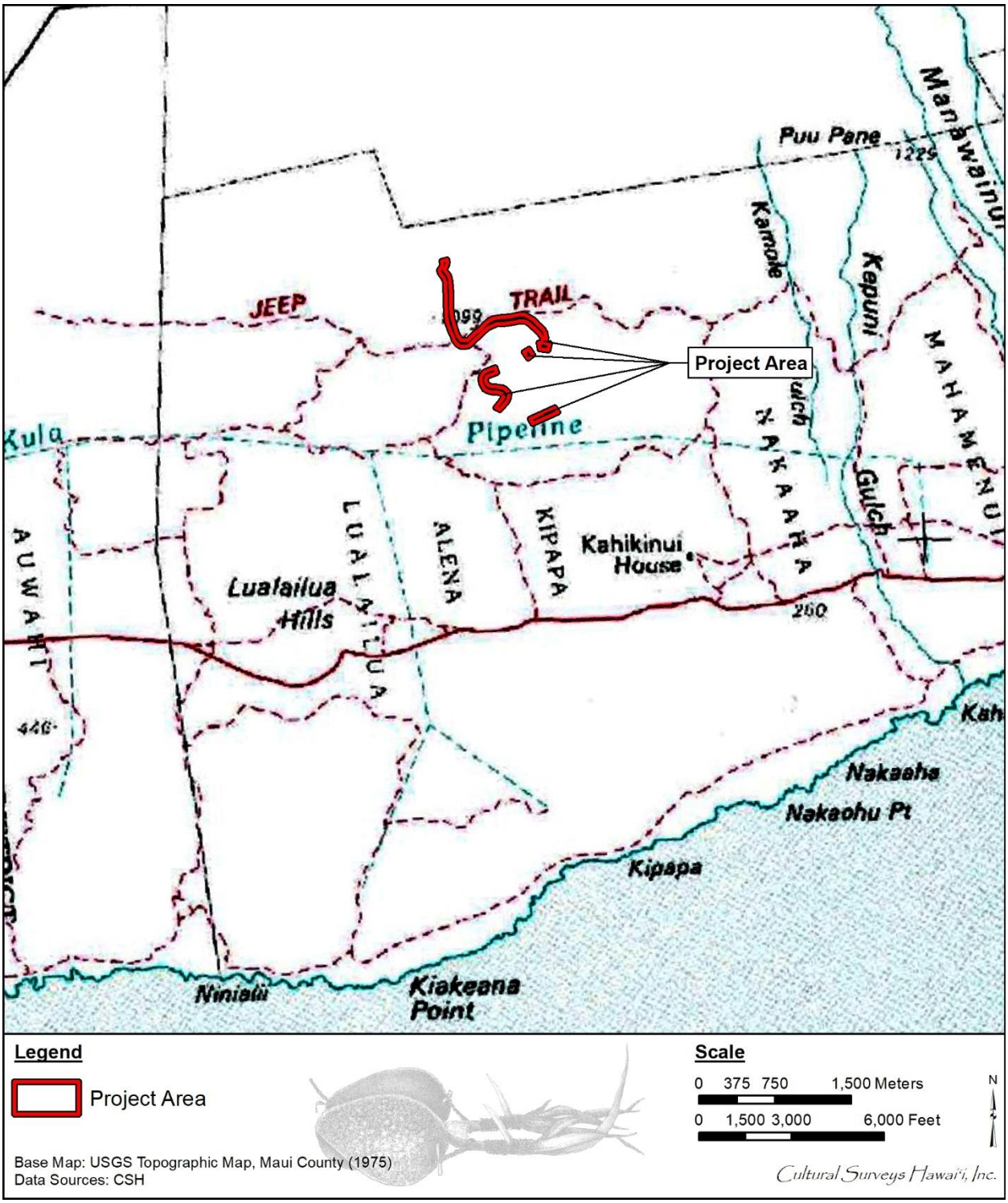

Figure 11. Portion of 1975 Maui County topographic quadrangle showing the current project area in relation to the alignment of several jeep trails (U.S. Geological Survey 1975)

3.2 Previous Archaeological Research

Four previous archaeological studies have been conducted within the DHHL Kahikinui Homesteads subdivision. Previous studies include a helicopter/pedestrian survey (Folk and Hammatt 1994), an archaeological reconnaissance survey (Dixon et al. 1996), an AIS (Cordy and Dixon 1997), and an archaeological monitoring study (Formolo and Hammatt 2004). Archaeological studies conducted within or adjacent to the current project area are depicted in Figure 12 and findings are summarized in Figure 13 and Table 1.

3.2.1 Folk and Hammatt (1994)

In 1994, CSH conducted an archaeological reconnaissance survey of an approximate 8,300-acre project area in the Kahikinui uplands in order to clearly define the presence/absence and boundaries of archaeological sites across the project parcel and aid in locating an area with the least amount of archaeological sites for the development of homestead locations for the DHHL (Folk and Hammatt 1994). Given the extensive area to be covered, this survey utilized 15 survey areas (Areas A through O) covered by means of aerial helicopter observations, to locate areas of lower site density suitable for the development of the homestead lots. Survey of these 15 areas led to the observation of 45 individual site areas across the 8,300-ac project area.

Areas H, I, and O of this study roughly correspond to the current project area. Additionally, Folk and Hammatt (1994) observed that these survey areas were nearly devoid of archaeological sites. Area H was entirely surveyed by helicopter between 2,400 and 3,200 ft. elevation and was observed to be devoid of archaeological sites. Area I, adjacent to Area H, was also surveyed entirely by helicopter and was found to contain only one site; a habitation shelter on the *makai* portion of the survey area. Area O, also surveyed entirely by helicopter, spanned the entire *mauka* portion of the 8,300-ac parcel and was similarly observed to contain no archaeological sites. Although Folk and Hammatt (1994) observed no archaeological sites within Area O, it was recommended that a closer inspection be conducted at the dissected terrain of Kamole and Kepuni Gulches at the lower terminus of this survey area.

3.2.2 Dixon et al. (1996)

Between 1995 and 1996, the SHPD conducted archaeological reconnaissance of the 2000-acre DHHL housing development in Kahikinui, consisting of 125 individual residential parcels and associated road easements (Dixon et al. 1996). During the pedestrian survey portion of the study Dixon et al. (1996) recorded 445 individual surface features. These features consisted of a stone alignment (1), cairns (15), C-shaped structures (34), enclosures (61), enclosed rock shelters (8), garden enclosures (2), *heiau* (4), L-shaped structures (49), lava tubes (9), mounds (10), modified outcrops (15), an overhang shelter (1), platforms (6), pavements (5), planting circles (2), rock shelters (27), terraces (90), terraced platforms (13), U-shaped structures (24), walls (62) and walled terraces (7). Most of the archaeological features were observed below the New Spine Road that bisects the *mauka* and *makai* portion of the project area. Pedestrian surveys conducted *mauka* of the New Spine Road identified only three archaeological features between the 2,800 and 4,100 ft AMSL elevations. Due to minimal coverage of this area, totaling six north to south transects across an area over 300 m wide, Dixon et al. (1996) noted that there may be additional features present within upland portions of the project area not identified by the pedestrian survey. Despite this

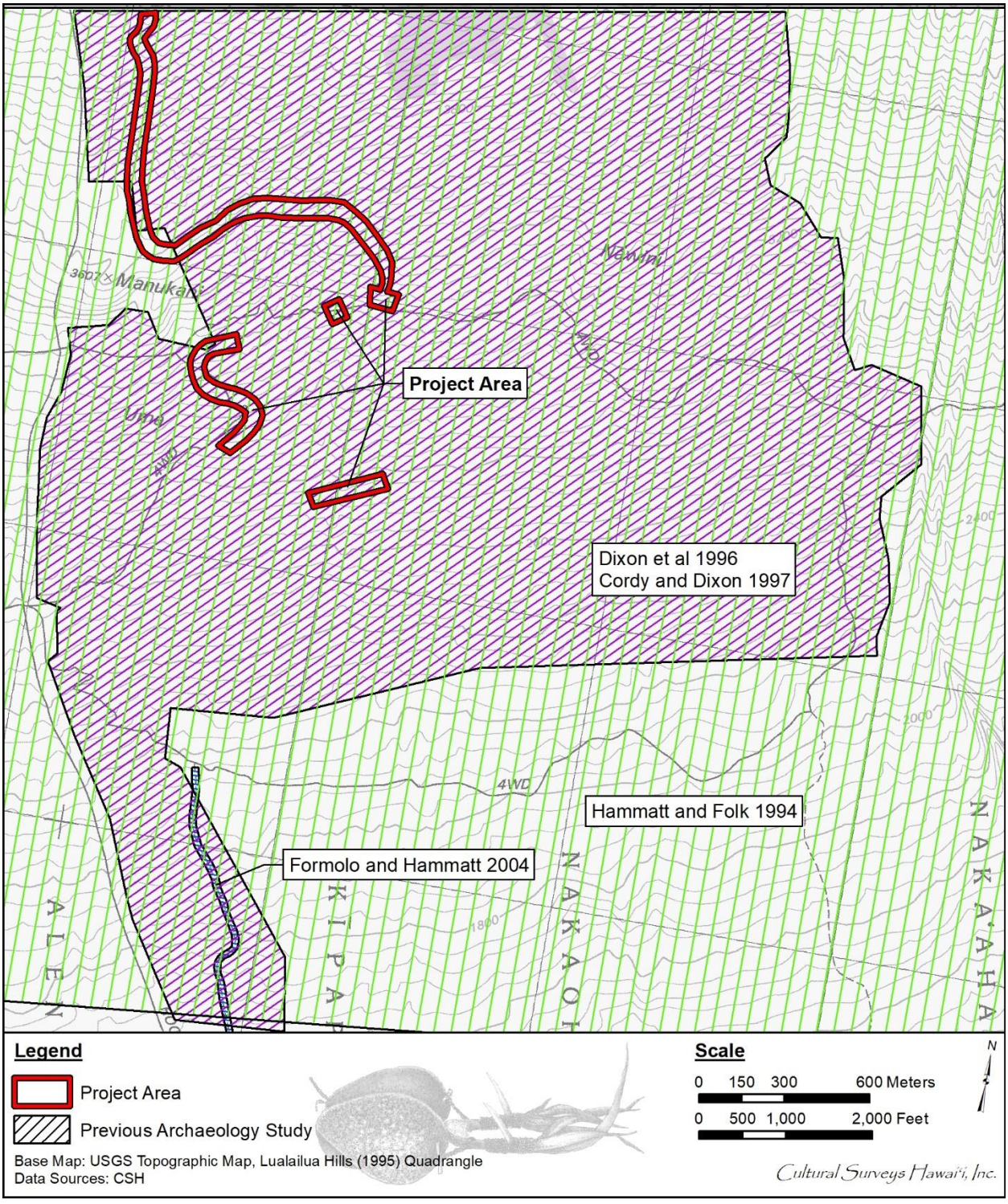

Figure 12. Portion of the 1995 Lualailua Hills USGS 7.5-minute topographic quadrangle showing previous archaeological studies within the DHHL Kahikinui Homesteads (U.S. Geological Survey 1995)

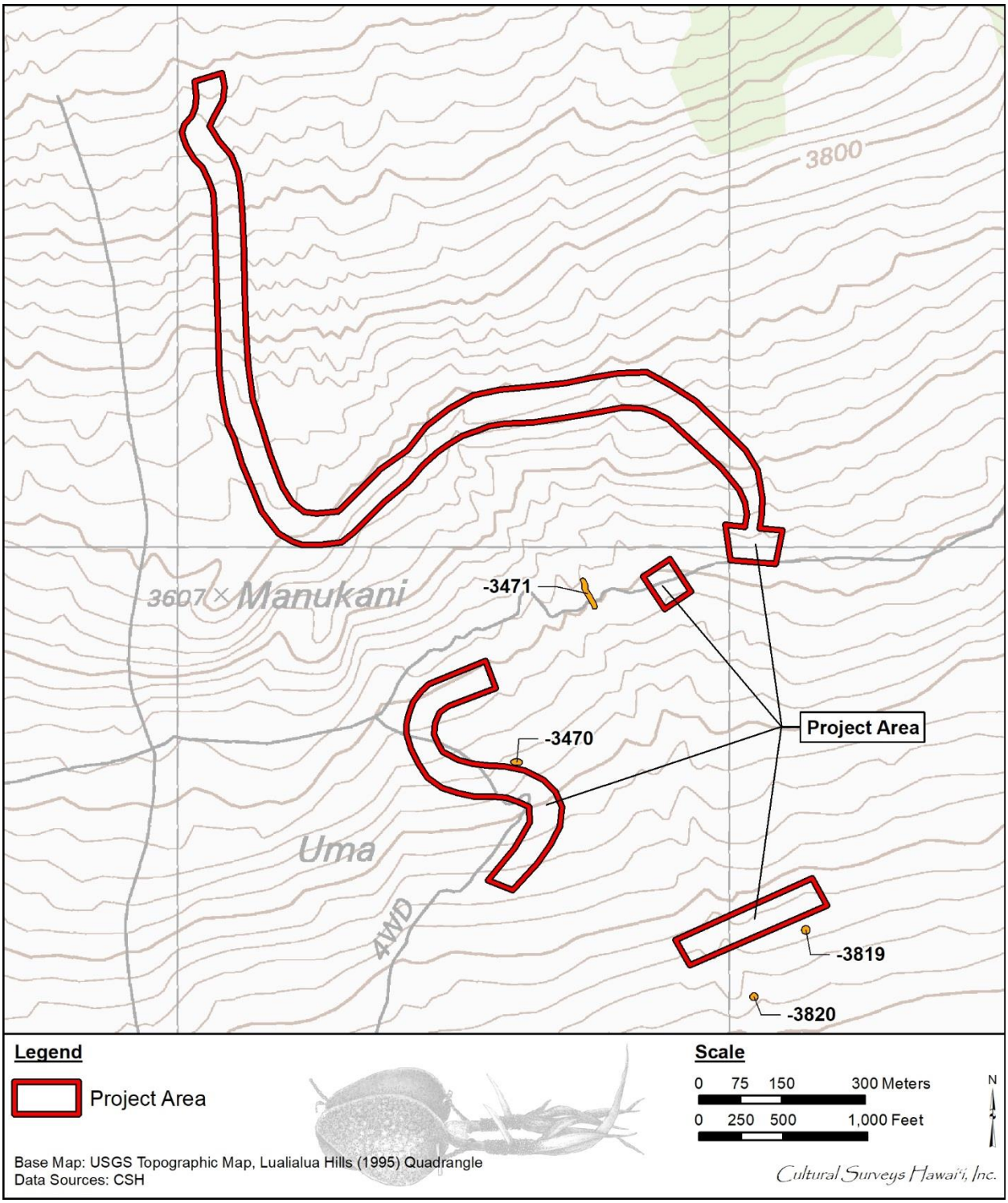

Figure 13. Portion of the 1995 Lualailua Hills USGS 7.5-minute topographic quadrangle showing documented historic properties located adjacent to the project area (U.S. Geological Survey 1995)

Table 1. Previous archaeological studies conducted in the DHHL Kahikinui Homesteads

Reference	**Type of Study**	**Location**	Results (SIHP # 50-50-15-)
Folk and Hammatt (1994)	Archaeological reconnaissance survey	8,300-ac. across *mauka* portions of Kīpapa, Nakaohu, and Nakaaha Ahupua‘a; TMK: [2] 1-9-001:003	Identified 45 areas of archaeological significance across 15 survey areas; no SIHP numbers assigned
Dixon et al. (1996)	Archaeological reconnaissance survey	Kahikinui Homesteads; TMK: [2] 1-9-001:003	Identified 454 surface features; final site count pending at time of publication
Cordy and Dixon (1997)	AIS	Kahikinui Homesteads; TMK: [2] 1-9-001:003	Identified 315 historic properties, of which four were within 100 m of the current project area: SIHP # -3470, two circular cairns; SIHP # -3471, a linear stone alignment; SIHP # -3819, irregular walled terrace; and SIHP # -3820, a rock shelter
Formolo and Hammatt (2004)	Archaeological monitoring	Kahikinui Homesteads; TMK: [2] 1-9-001:003	No historic properties identified

information, Dixon et al. (1996) deemed that upland regions of the Homestead lands needed no further archaeological work.

3.2.3 Cordy and Dixon (1997)

In 1997, the SHPD/DLNR published preliminary findings from their previous fieldwork as an AIS of the 2000-acre DHHL Kahikinui homesteads housing development (Cordy and Dixon 1997). The 445 features observed during the Dixon et al. (1996) survey were collated into 315 historic properties, some containing up to 18 individual features. Although the historic properties were considered by researchers to be comparatively small complexes, the sites encompassed a broad range of functional types including agricultural sites, permanent habitations, temporary habitations, religious/ceremonial structures, possible burial sites, *hōlua* slide complexes, boundary markers, ranch related walls and features, and lithic workshops/quarries.

Four historic properties were identified within 100 m of the current project area. These include two circular cairns serving as boundary markers (SIHP # -3470), a linear stone alignment boundary marker (SIHP # -3471), an irregularly shaped walled terrace serving as a temporary habitation (SIHP # -3819, and a rock shelter used for storage (SIHP # -3820). SIHP #s -3470, -3819, and -3820 were recommended for further data recovery before being impacted by the future development plans. SIHP # -3471 was recommended for preservation. No further survey work was conducted within *mauka* portions of the project area (above 2,800 ft AMSL) during both the Dixon et al. (1996) and the Cordy and Dixon (1997) studies.

3.2.4 Formolo and Hammatt (2004)

Between March and February 2004, CSH conducted archaeological monitoring accompanying the installation of drainage swales and the re-grading of existing roads within the Kahikinui homestead project from Pi‘ilani Highway up to the 3,000 ft AMSL elevation (Formolo and Hammatt 2004). During this study the fore-mentioned improvements took place along the existing roadway in addition to grading activities at five staging areas for equipment and material storage. One additional access road was newly cut from the established road alignment to a site for a proposed reservoir, of which only 50 m of this road had been completed at the time of the report. No historic properties were identified within the study area.

Section 4 Results of Fieldwork

Fieldwork was accomplished on 15 through 17 July 2019 by Jonas Madeus, B.A., and Jay Rapoza, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. This work required approximately six person-days to complete. The AIS included a 100 percent pedestrian inspection of the project area and complete documentation and mapping of all surface historic properties.

While the DHHL Kahikinui Homesteads have been subject to previous archaeological studies and research, no previous studies included a 100 percent coverage inspection of the area above 2,800 ft AMSL, which includes the majority of the current project area (2,700 to 4,200 ft AMSL). The area above 2,800 ft AMSL was assumed to be relatively devoid of archeological sites. Ground visibility in the project area was generally poor due to the dense matting of *kukuyu* grass and other ground cover growing outside of the existing driveway corridor (Figure 14 through Figure 16).

Two historic properties, SIHP #s -8673 and -8674, were identified on the surface of the project area during the 100 percent pedestrian inspection. SIHP # -8673 is a complex of four agricultural terraces, Features A through D, on the southeastern side of a steep knoll near a four-wheel drive road in the central portion of the project area. SIHP # -8674 is a modified outcrop consisting of four rock mounds, Features A through D, approximately 20 m south of an access road in the southern portion of the project area. Documentation included vegetation clearing, photographs, recordation with a hand-held GPS unit, and historic property descriptions. No subsurface testing was conducted.

Additional potential features that had been discussed during the LRFI were further investigated, and the areas were cleared of vegetation to assess any evidence of cultural modification. SIHP # -8673 Features A through D were not described during the LRFI, as the location was beyond the boundaries of the project area at that time and portions have since been expanded for the current study.

Figure 14. General view of the northern (*mauka*) portion of the project area showing the unimproved and an overview of the predominant ground cover, view to south

Figure 15. General view of the central portion of the project area showing the unimproved road and vegetation cover, view to southeast

Figure 16. General view of the southern (*makai*) portion of the project area showing the end of a concrete-paved portion of the road and vegetation cover, view to south

Section 5 Historic Property Descriptions

Two historic properties were identified within the current project area during the AIS. They are summarized in Table 2 and their distributions are depicted on Figure 17 through Figure 18.

Table 2. Historic properties identified during the AIS within the project area

SIHP #	Formal Type	Function
50-50-15-8673	Complex	Agriculture
50-50-15-8674	Complex	Agriculture – field clearance

5.1 SIHP # 50-50-15-8673

FORMAL TYPE:	Complex
FUNCTION:	Agriculture
NUMBER OF FEATURES:	4
AGE:	Pre-Contact
TAX MAP KEY:	[2] 1-9-001:003
LAND JURISDICTION:	DHHL
PREVIOUS DOCUMENTATION:	None

SIHP # 50-50-15-8673 is a complex of four agricultural terraces, Features A through D, on the southwestern side of the four-wheel drive road in the central portion of the project area. The terrace complex was constructed against the southeastern side of a rocky and steep knoll (Figure 20 through Figure 26). The access road adjacent to the historic property is an S-shaped curve in a mostly north to south path through the DHHL Kahikinui Homesteads. The complex extends downslope to the southwest approximately 12.00 m and is approximately 9.50 m wide. The maximum height of the four terraces is 1.30 m. No cultural materials were observed during the surface investigation. SIHP # -8673 is considered to be of pre-Contact origin based on construction style, absence of post-Contact tool marks or cultural material, and proximity to other identified pre-Contact historic properties.

SIHP # -8673 Feature A is the uppermost agricultural terrace situated against the top of the knoll. It is irregular in shape and crude due to rockfall and degradation. The terrace is 8.00 m long and 2.00 m wide. The terrace wall is constructed of small to medium angular basalt boulders and cobbles that have been stacked along the edge of a linear outcrop one- to four-courses high to a maximum height of 1.30 m. The width of the rocks forming the retaining wall ranges from 0.50 to 1.00 m. The interior of the terrace is flat and grass-covered with a thin layer of soil and angular basalt cobbles, boulders, and exposed outcrop.

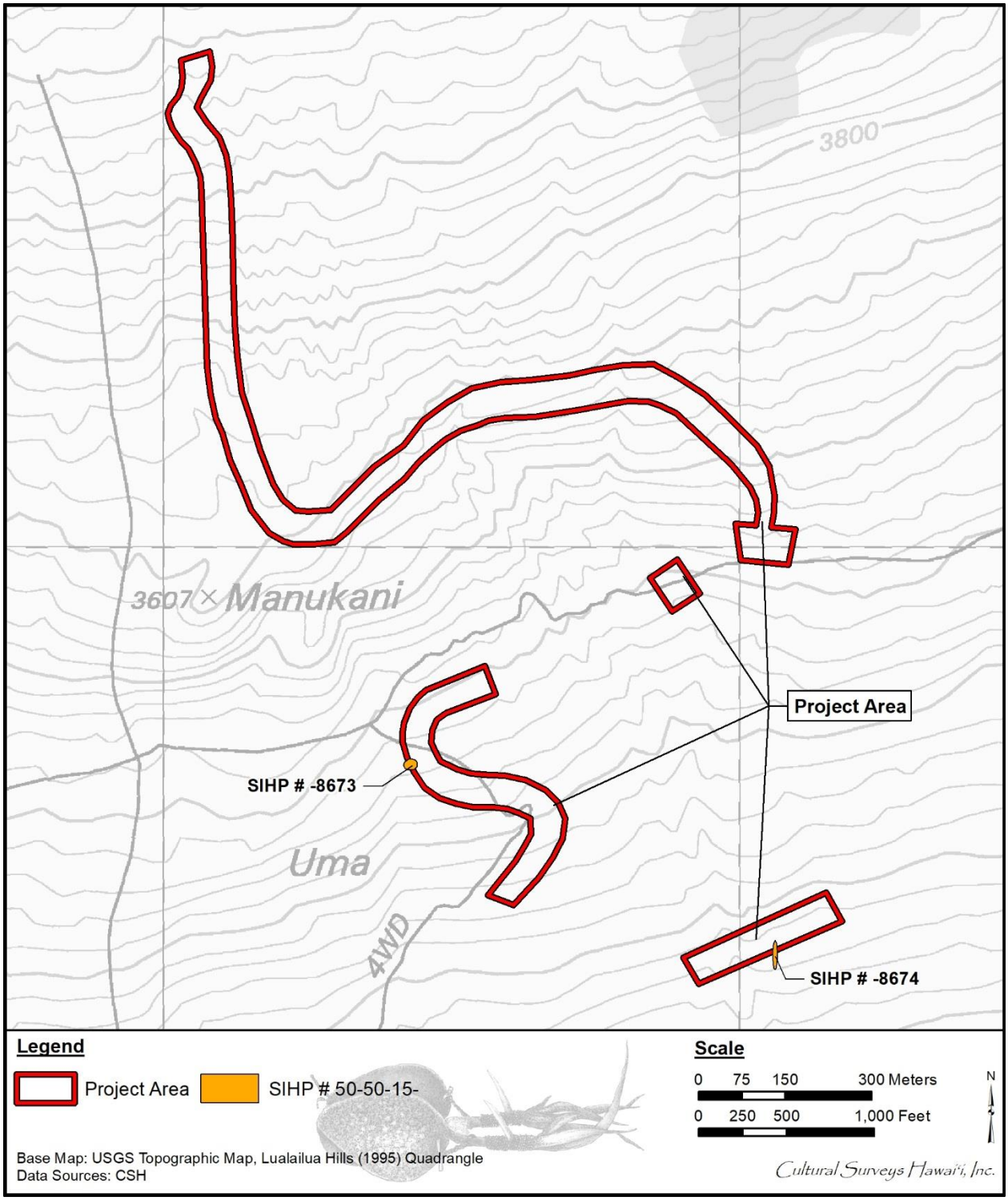

Figure 17. Portion of the 1995 Lualailua Hills USGS 7.5-minute topographic quadrangle depicting the locations of SIHP #s 50-50-15-8673 and -8674 (U.S. Geological Survey 1995)

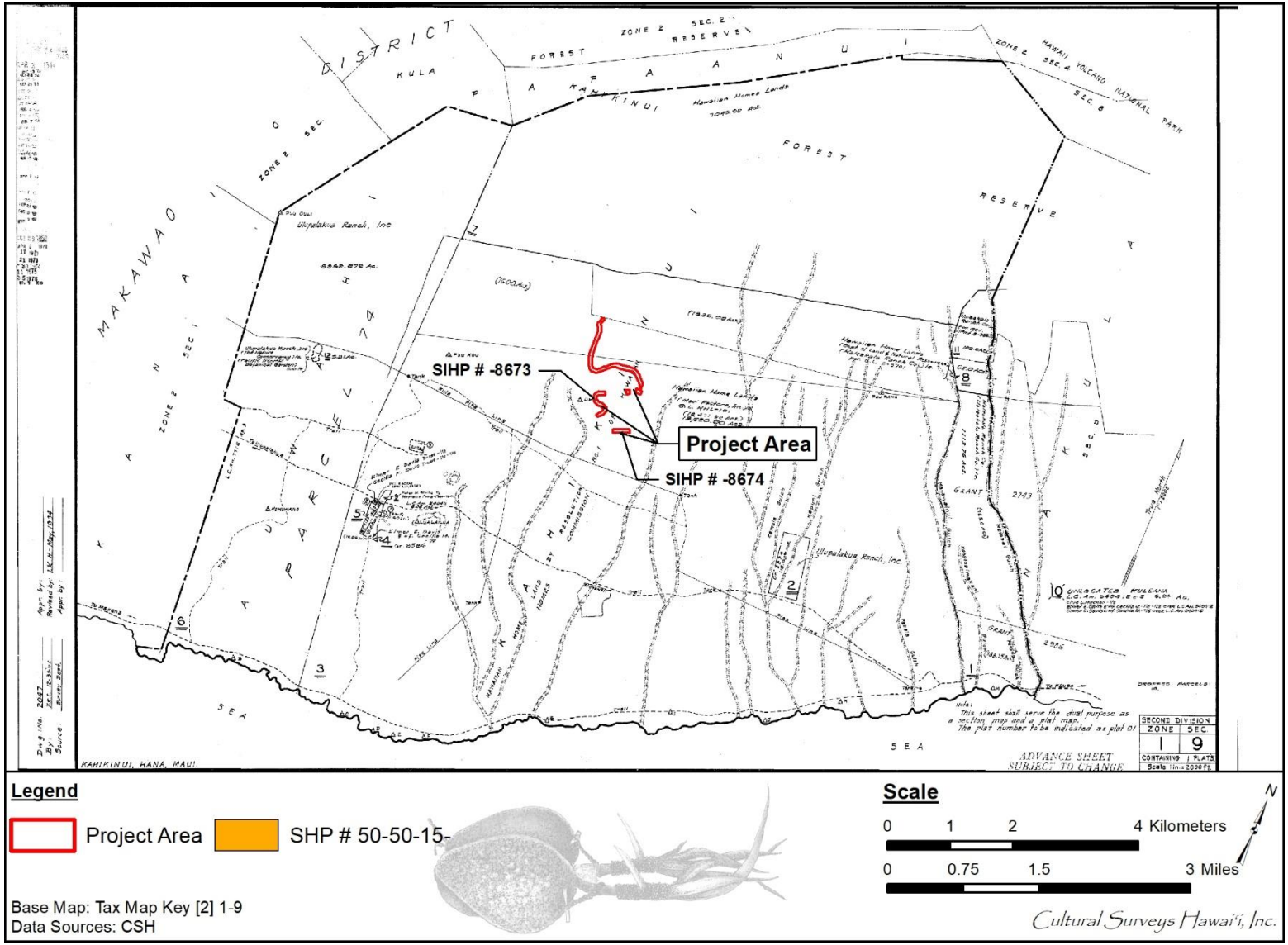

Figure 18. TMK: [2] 1-9 showing the locations of SIHP #s -8673 and -8674 within the project area (Hawaii TMK Service 2014)

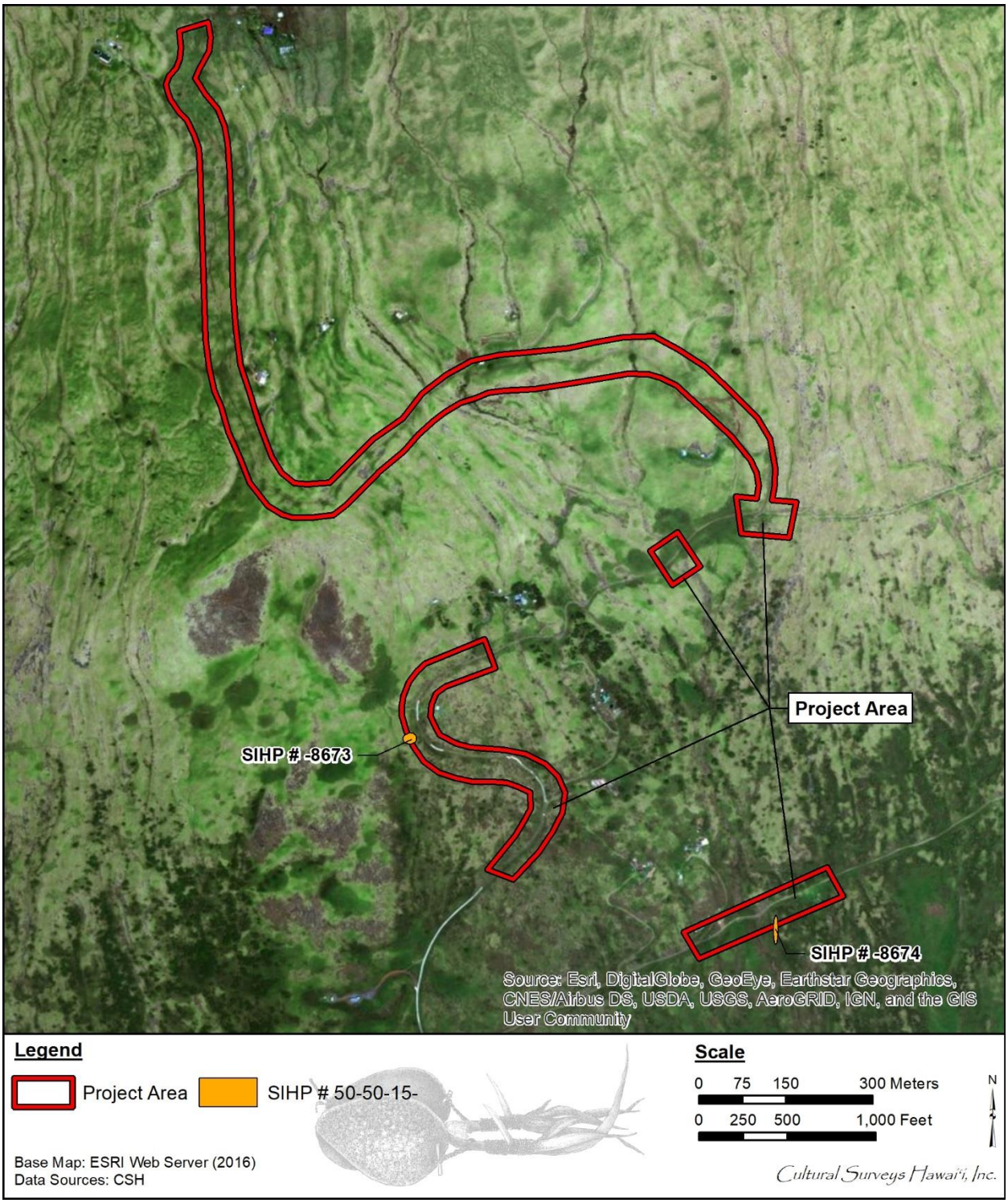

Figure 19. Aerial photograph of the project area depicting the extents of SIHP #s 50-50-15-8673 and -8674 (Esri 2016)

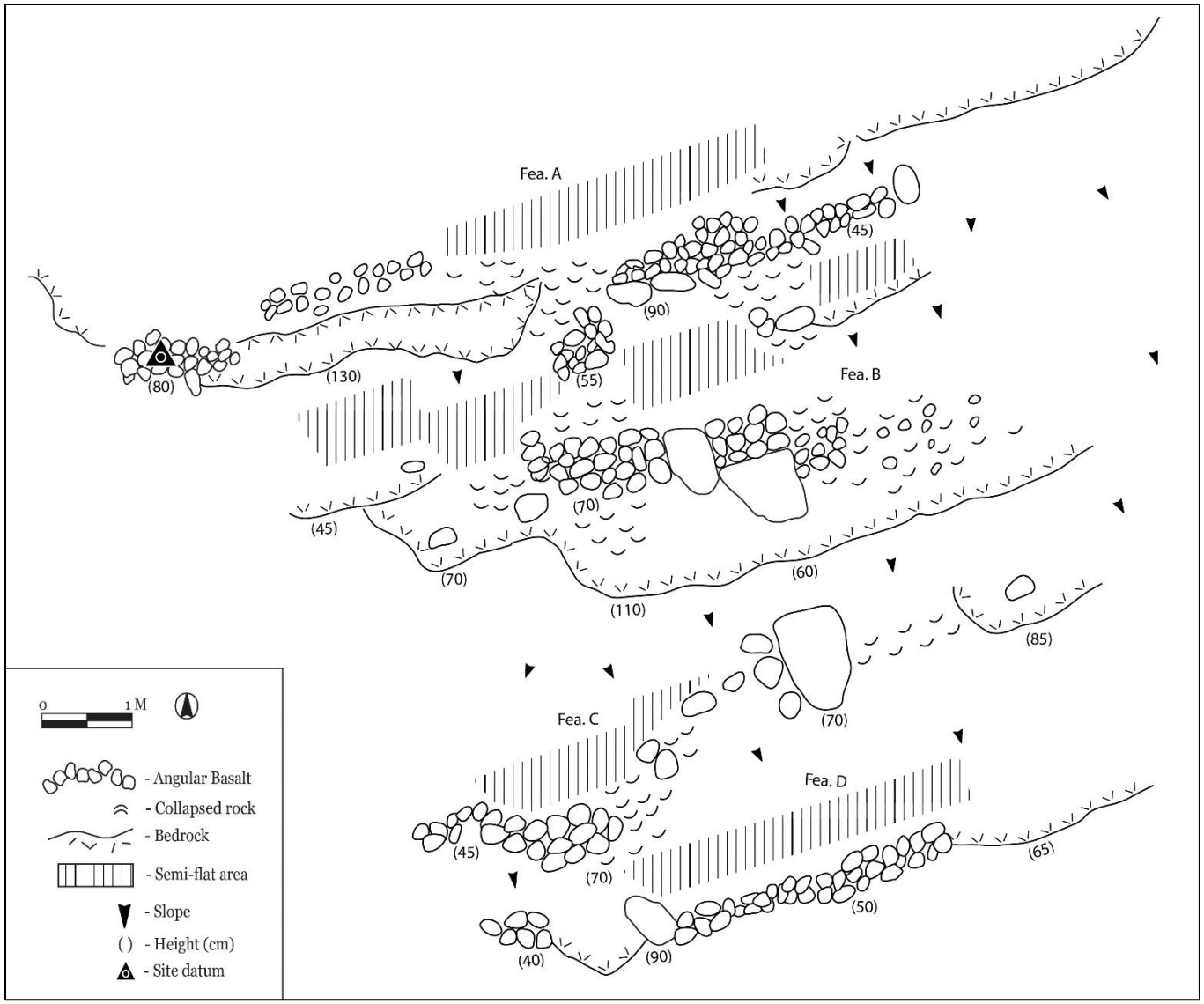

Figure 20. SIHP # 50-50-15-8673, plan map showing complex of four agricultural terraces, Features A through D

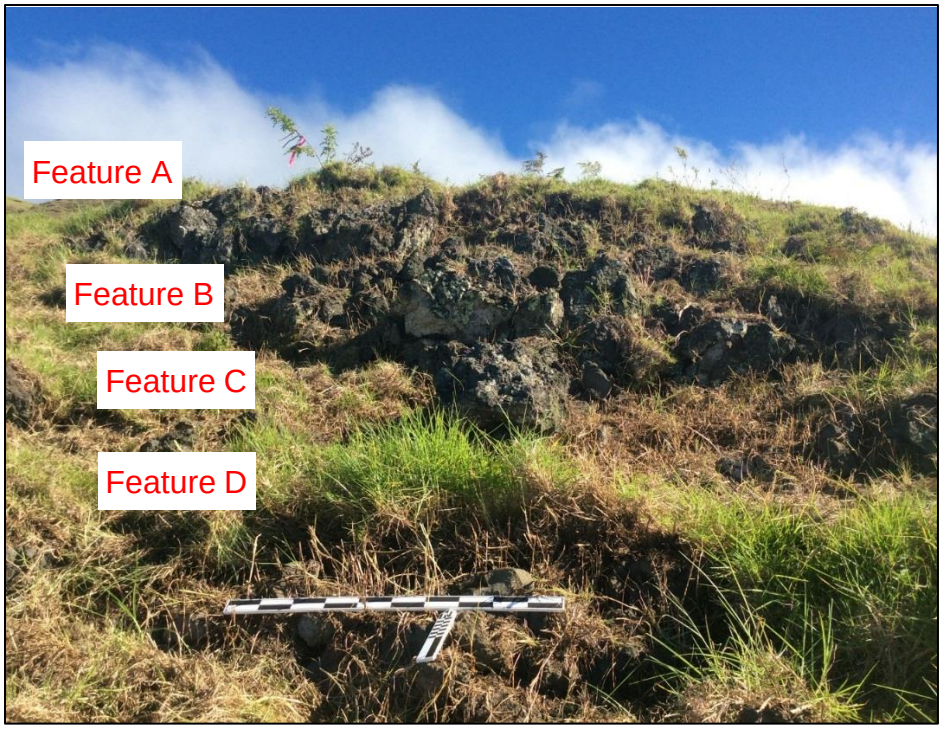

Figure 21. SIHP # -8673 Features A through D on the southeastern slope of a project area access road, view to the north

Figure 22. SIHP # -8673 Features A through D on the southeastern slope of a project area access road, view to the northwest

Figure 23. SIHP # -8673 Feature A, uppermost terrace, view to northeast

Figure 24. SIHP # -8673 Feature B, agricultural terrace directly downslope of Feature A, view to the northeast

Figure 25. SIHP # -8673 Feature C, agricultural terrace directly downslope of Features B and A, view to the northeast

Figure 26. General view of SIHP # -8673 Feature D, agricultural terrace downslope of Features C through A, view to northeast

SIHP # -8673 Feature B is an agricultural terrace directly downslope of Feature A. The interior of Feature B abuts the southeastern side of the base of the Feature A terrace wall. Feature B is roughly rectangular and very crude due to rockfall and degradation. The terrace is approximately 6.00 m long and 2.70 m wide with a semi-flat interior composed of a grass-covered, thin layer of soil and angular basalt cobbles, boulders, and natural outcrops. The terrace wall is constructed from small to medium angular basalt boulders and cobbles stacked one- to five-courses high to a maximum height of 1.10 m. The rocks forming the retaining wall are between 0.55 and 0.85 m wide. It is partially collapsed and incorporates the natural outcrops in the construction of the terrace wall (see Figure 24).

SIHP # -8673 Feature C is an agricultural terrace directly downslope of Feature B. The interior of Feature C abuts the southeastern side of the base of the Feature B terrace wall. Feature C has an irregular shape and is in very crude condition due to rockfall and degradation. The terrace is approximately 8.00 m long. The semi-flat interior is approximately 1.00 m wide and composed of a grass-covered layer of soil and angular basalt cobbles, boulders, and natural outcrops. The terrace wall is constructed from small to medium angular basalt boulders and cobbles stacked one- to four-courses high to a maximum height of 0.85 m. The wall is between 0.35 and 1.00 m wide. It is partially collapsed and incorporates the natural outcrops in the construction of the terrace wall (see Figure 25).

SIHP # -8673 Feature D is an agricultural terrace situated at the base of the knoll, abutting the southeastern side of Feature C. Feature D has an irregular shape and is in very crude condition due to rockfall and degradation. The terrace is approximately 6.00 m long and 2.0 m wide with a semi-flat interior composed of a grass-covered layer of soil and angular basalt cobbles, boulders, and natural outcrops. The terrace wall is constructed from small to medium angular basalt cobbles and boulders stacked one- to four-courses high to a maximum height of 0.90 m. The wall is between 0.40 and 0.70 m wide. It is partially collapsed and incorporates the natural outcrops in the construction of the terrace wall (see Figure 26).

SIHP # -8673 is assessed as significant pursuant to HAR §13-13-275-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.

5.2 **SIHP # 50-50-15-8674**

FORMAL TYPE:	Complex
FUNCTION:	Agriculture – field clearance
NUMBER OF FEATURES:	4
AGE:	Pre-Contact
TAX MAP KEY:	[2] 1-9-001:003
LAND JURISDICTION:	DHHL
PREVIOUS DOCUMENTATION:	None

SIHP # 50-50-15-8674 is a complex of four rock mounds, Features A through D that are constructed on the surface of a basalt outcrop. The outcrop extends along the top of a ridge, approximately 20 m south of an access road off the main road. The four rock mounds along the modified outcrop are oriented in a north to south direction. No associated cultural materials were present. SIHP # -8674 is near SIHP # -8674, agricultural terraces recorded during the current study. and two previously identified historic properties, SIHP # -3819, irregular walled terrace, and SIHP # -3820, a rock shelter that were documented by Cordy and Dixon (1997). SIHP # -8674 is considered to be of pre-Contact origin based on construction style, absence of post-Contact tool marks or cultural material, and proximity to other identified pre-Contact historic properties

The four rock mounds, SIHP # -8674 Features A through D, are constructed from angular basalt boulders and cobbles. Overall, the complex is approximately 25.0 m long and 4.0 m wide (Figure 28 and Figure 29). All of the mounds are in crude condition and are roughly circular or irregular in shape. Feature A is at the southern end of the four features. It incorporates the basalt outcrop in the mound. Feature A is approximately 2.0 m by 1.6 m and stacked roughly three courses to a height of 50.0 cm (Figure 30). Feature B is on the northern side of Feature A. It includes larger basalt boulders over the outcrop and is 6.0 m by 3.0 m and stacked three courses high to a maximum height of 105.0 cm (Figure 31). Feature C is approximately 3.5 m north of Feature B. It is approximately 3.0 m by 2.7 m and stacked roughly three courses high to a maximum height of 80.0 cm (Figure 32). Feature D is the northern-most of the four rock mound features. It is approximately 20 m south of the access road. The mound is approximately 4.0 m by 3.2 m and stacked roughly three courses high to a maximum height of 60.0 cm (Figure 33). Several basalt boulders are north of Feature D.

SIHP # -8674 is assessed as significant pursuant to HAR §13-13-275-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.

Figure 27. General view of the access road in the southernmost section of the project area that extends adjacent to SIHP # -8674; note developed house lot on the left and modified outcrop is approximately 50 m west of the house, view to east

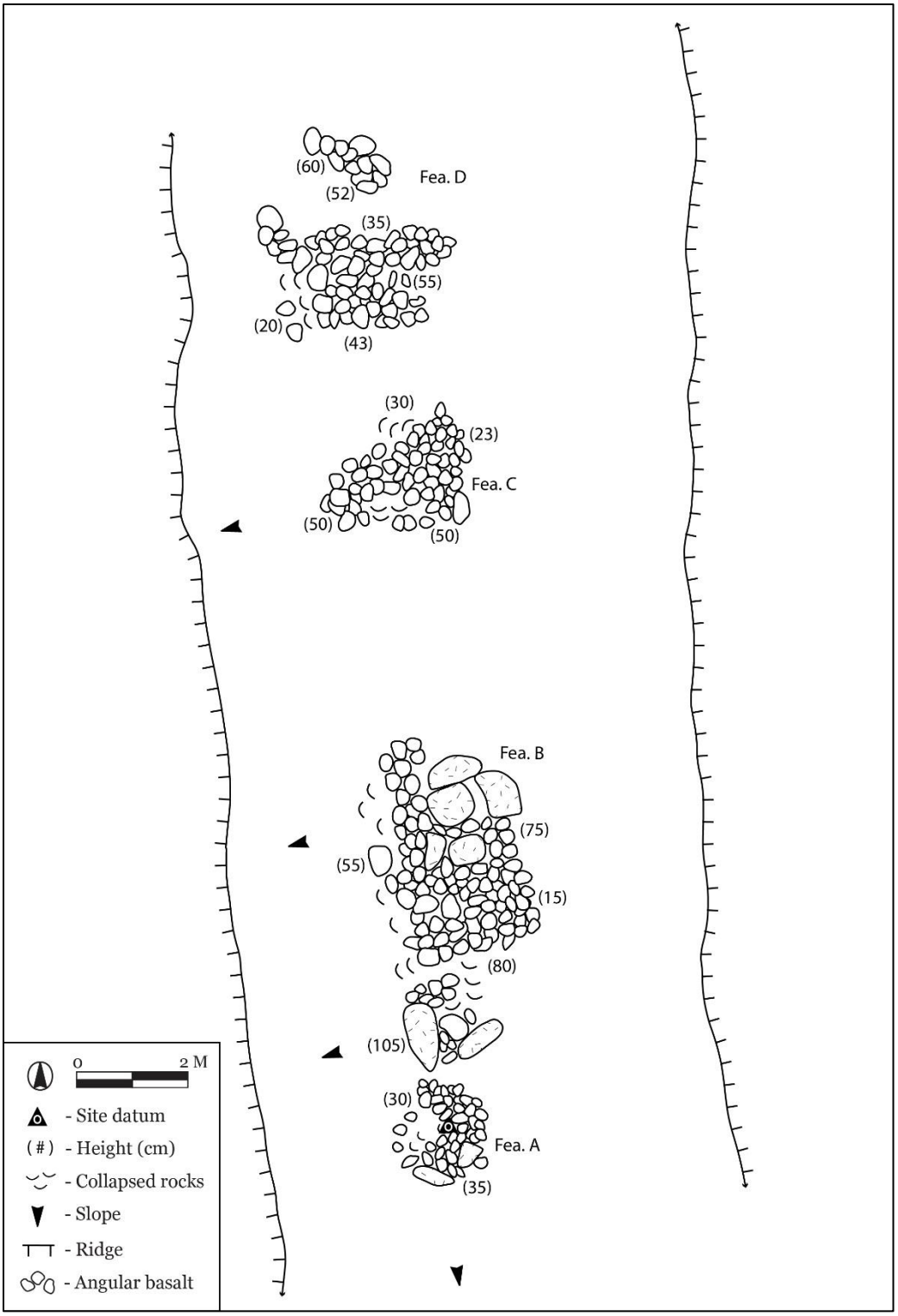

Figure 28. SIHP # 50-50-15-8674 Features A through D, plan map

Figure 29. Overview of SIHP # -8674, view to the south

Figure 30. SIHP # -8674 Feature A, rock mound, view to north

Figure 31. SIHP # -8674 Feature B, rock mound, view to northeast

Figure 32. SIHP # -8674 Feature C, rock mound, view to northwest

Figure 33. SIHP # -8674 Feature D, rock mound, view to south

Section 6 Significance Assessments

Historic property significance is assessed based on the five State of Hawai‘i historic property significance criteria. To be considered significant, a historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and/or association and meet one or more of the following broad cultural/historic significance criteria (in accordance with HAR §13-13-275-6):

a. Be associated with events that have made an important contribution to the broad patterns of our history;

b. Be associated with the lives of persons important in our past;

c. Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;

d. Have yielded, or is likely to yield, information important for research on prehistory or history; or

e. Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

Two new historic properties were identified within the current project area. Table 3 lists the historic properties along with their significance assessments and mitigation recommendations.

- SIHP # 50-50-15-8673 is complex consisting of four agricultural terraces, Features A through D, that is assessed as significant pursuant to HAR §13-13-275-6, Criterion "d" (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.
- SIHP # 50-50-15-8674 is complex consisting of four stone mounds, Features A through D, that is assessed as significant pursuant to HAR §13-13-275-6, Criterion "d" (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.

Table 3. Archaeological Historic Property Integrity, Significance, and Mitigation Recommendations

SIHP # 50-50-15	Formal Type/ Description	Integrity							Significance	Mitigation Recommendation
		Location	Design	Setting	Materials	Workmanship	Feeling	Association		
-8673	Complex (4)	Y	Y	Y	Y	Y	N	N	d	No further work
-8674	Complex (4)	Y	Y	Y	Y	Y	N	N	d	No further work

Section 7 Project Effect and Mitigation Recommendations

7.1 Project Effect

Two historic properties (SIHP #s -8673 and -8674) were identified during the AIS that have the potential to be affected by project construction. This AIS report provides sufficient documentation of these historic properties. As such, the effect recommendation for the current project is "no historic properties affected", per HAR §13-13-275-7.

7.2 Mitigation Recommendations

No further work is recommended for the two historic properties that were identified during the AIS. SIHP #s -8673 and -8674 have been sufficiently documented by this AIS and have reached their information potential. This AIS report also provides sufficient documentation of the information important to research on prehistory or history for each historic property including location, dimensions, content, representative photographs, plan and profile maps, age, function, integrity, and significance.

Section 8 Summary

At the request of Austin, Tsutsumi & Associates, Inc., and on behalf of the DHHL, CSH has prepared this AIS report for the Kahikinui Homesteads Road Improvements Project, Kīpapa Ahupua‘a, Hāna District, Maui, TMK: [2] 1-9-001:003. The project is located on the southern leeward slopes of Haleakalā approximately 2.6 km (1.64 mi) upslope (north) of Pi‘ilani Highway (Route 31).

CSH completed AIS fieldwork for the current project from 15 through 17 July 2019. This work required approximately six person-days to complete and was conducted under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. The AIS included a 100 percent pedestrian inspection of the project area. Two new historic properties were identified on the surface of the project area, SIHP #s 50-50-15-8673 and -8674.

SIHP # -8673 is a complex of four agricultural terraces, Features A through D, on the southwestern side of the four-wheel drive road in the central portion of the project area. The terrace complex was constructed against the southeastern side of a rocky and steep knoll. The access road adjacent to the historic property is an S-shaped curve in a mostly north to south path through the DHHL Kahikinui Homesteads. SIHP # -8673, agricultural complex, is assessed as significant pursuant to HAR §13-13-275-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.

SIHP # 50-50-15-8674 is a complex consisting of four rock mounds, Features A through D, constructed along the surface of a basalt outcrop. The outcrop extends along the top of a ridge, approximately 20 m south of an access road off the main road. The portion of this small access road in the project area extends in a southwest to northeast direction. The four rock mounds are oriented in a north to south direction along the modified outcrop. SIHP # -8674, modified outcrop, is assessed as significant pursuant to HAR §13-13-275-6, Criterion “d” (have yielded, or is likely to yield, information important for research on prehistory or history). The historic property retains the integrity of location, design, setting, materials, and workmanship and has provided information regarding historic land use of the project area.

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